"STUDY ON DRUG UTILIZATION PATTERN OF ANTI-HYPERTENSIVES AT A TERTIARY CARE TEACHING HOSPITAL"

Dissertation submitted to

The Tamil Nadu Dr. M.G.R. Medical University, Chennai

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MASTER OF PHARMACY

Submitted by

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COIMBATORE - 641 044

Certificate

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in Sri Ramakrishna Hospital, Coimbatore attached to the College of Pharmacy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore which is affiliated to The Tamil Nadu Dr. M.G.R Medical University, Chennai, under the direct supervision and guidance of **Mrs. B.CHITRA, M.Pharm., (Ph.D).,** Assistant professor, Department of Pharmacy Practice, College of Pharmacy, Sri Ramakrishna Institute of Paramedical Sciences, Coimbatore.

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CONTENTS

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ACE	Angiotensin Converting Enzyme
ADE	Adverse Drug Events
ADR	Adverse Drug Reaction
ARBs	Angiotensin Receptor Blockers
ARF	Acute Renal Failure
ATC	Anatomical Therapeutic Chemical
BMI	Body Mass Index
BP	Blood Pressure
CAD	Coronary Artery Disease
CCB	Calcium Channel Blocker
CHF	Congestive Heart Failure
CKD	Chronic Kidney Disease
CNS	Central Nervous System
COPD	Chronic Obstructive Pulmonary Disease
CRF	Chronic Renal Failure
CVD	Cardio Vascular Disease
DBP	Diastolic Blood Pressure
DDD	Defined Daily Dose
DM	Diabetes Mellitus
DU	Drug Utilization
ESRD	End Stage Renal Disease
HF	Heart Failure
IBW	Ideal Body Weight
IHD	Ischemic Heart Disease
JNC	Joint National Committee
LRTI	Lower Respiratory Tract Infection
MI	Myocardial Infarction

NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
PDD	Prescribed Daily Dose
PUD	Peptic Ulcer Disease
SBP	Systolic Blood Pressure
SHT	Systemic Hypertension
TD	Thiazide Diuretics
UTI	Urinary Tract Infection
WHO	World Health Organization

Hypertension is a chronic illness associated with high morbidity and mortality. Once hypertension is diagnosed, starting antihypertensive therapy on a long-term basis along with regular follow up is important. The main objective of the study is to assess the utilization pattern of antihypertensive in a tertiary care hospital at Coimbatore. A prospective observational study was conducted for a period of ten months from November 2017 to August 2018 in general medicine department of Sri Ramakrishna Hospital, Coimbatore. A total of 102 prescriptions were analysed. Through the current study, we could assess the drug utilization pattern of antihypertensive in general medicine department. The study report shows male population was higher compared to female. Diabetes mellitus was the predominal diagnosis in general medicine department. Calcium channel blocker followed by beta blockers were the most frequently utilized drugs in the study. Among calcium channel blocker and beta blockers, amlodipine and atenolol were highly utilized in general medicine department respectively. The study also identified various risk factor associated in hypertensive patients where smoking was the most affecting factor. The current study assessed the major drug interactions which were found to be highly significant. Identifying and monitoring drug interactions helps in forming a standard therapeutic plan. It has provided an insight into the prescription patterns of antihypertensive medications with respect to the level of BP control. It will help prescribers to pay more attention that affect outcome of BP. The trend of hypertension is on the rise, if treated rationally this disease can be overcome.

The principal aim of drug utilization research is to facilitate the rational use of drugs in populations. For the individual patient, the rational use of a drug implies the prescription of a well-documented drug at an optimal dose, together with the correct information, at an affordable price.

Drug utilization research also provides insight into the efficiency of drug use, i.e. whether a certain drug therapy provides value for money and the results of such research can be used to help to set priorities for the rational allocation of health care budgets[1].

High blood pressure is defined as a systolic blood pressure (BP) ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg[2].The diastolic pressure represents the pressure during ventricular relaxation in diastole whereas the systolic pressure represents the peak pressure due to ventricular contraction during systole. Either or both pressures have specified upper limits of normal and elevation in either or both pressures are used to define hypertension[3]According to the seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure JNC 7th report (2004) defined and classified hypertension

Blood Pressure Categories in Adults (Current Guidelines)			
Category	Systolic (mmHg)		Diastolic (mmHg)
Normal	< 120	And	< 80
Elevated	120 – 129	And	< 80
Hypertension			
Stage 1	130 – 139	Or	80 – 89
Stage 2	≥ 140	Or	≥ 90

in adults, as shown in Table 1[4].

Signs and Symptoms:

The primary hypertension patient may be generally asymptomatic or may impose serious cardiovascular disease risk factors, perhaps America Heart Association, mentions cardiovascular risk factors associate with age, gender, heredity, smoking, high lipid profile, obesity and overweight, Diabetes mellitus.

Adult patients with an average of two or more previous elevated blood pressure readings[2].

Causes:

Despite the fact that the definite reasons for hypertension are generally obscure, there are a few variables that have been very connected with the condition. These include:

- Smoking
- Obesity or being overweight
- Being stout/overweight as a kid
- Diabetes
- Sedentary way of life
- Lack of physical action
- High levels of salt admission (sodium affectability)
- Insufficient calcium, potassium, and magnesium utilization
- Vitamin D lack
- High levels of liquor utilization
- Stress
- Aging
- Medicines, for example, conception prevention pills
- Genetics and a family history of hypertension (a few qualities in the kidneys may add to hypertension)
- Chronic kidney sickness
- Adrenal and thyroid issues or tumors[5].

Medications to treat high blood pressure:

Thiazide diuretics:

Diuretics, sometimes called water pills, are medications that act on your kidneys to help your body eliminate sodium and water, reducing blood volume. Thiazide diuretics are often the first, but not the only, choice in high blood pressure medications. Thiazide diuretics include hydrochlorothiazide (Microzide), chlorthalidone and others.

If you're not taking a diuretic and your blood pressure remains high, talk to your doctor about adding one or replacing a drug you currently take with a diuretic. Diuretics or calcium channel blockers may work better for black and older people than do angiotensin-converting enzyme (ACE) inhibitors alone. A common side effect of diuretics is increased urination.

Beta blockers:

These medications reduce the workload on your heart and open your blood vessels, causing your heart to beat slower and with less force. Beta blockers include acebutolol (Sectral), atenolol (Tenormin) and others.

When prescribed alone, beta blockers don't work as well, especially in black and older people, but may be effective when combined with other blood pressure medications.

Angiotensin-converting enzyme (ACE) inhibitors:

These medications — such as lisinopril (Zestril), benazepril (Lotensin), captopril (Capoten) and others — help relax blood vessels by blocking the formation of a natural chemical that narrows blood vessels. People with chronic kidney disease may benefit from having an ACE inhibitor as one of their medications.

Angiotensin II receptor blockers (ARBs):

These medications help relax blood vessels by blocking the action, not the formation, of a natural chemical that narrows blood vessels. ARBs include candesartan (Atacand), losartan (Cozaar) and others. People with chronic kidney disease may benefit from having an ARB as one of their medications.

Calcium channel blockers:

These medications — including amlodipine (Norvasc), diltiazem (Cardizem, Tiazac, others) and others — help relax the muscles of your blood vessels. Some slow your heart rate. Calcium channel blockers may work better for black and older people than do ACE inhibitors alone. Grapefruit juice interacts with some calcium channel blockers, increasing blood levels of the medication and putting you at higher risk of side effects. Talk to your doctor or pharmacist if you're concerned about interactions.

Renin inhibitors:

Aliskiren (Tekturna) slows down the production of renin, an enzyme produced by your kidneys that starts a chain of chemical steps that increases blood pressure.

Tekturna works by reducing the ability of renin to begin this process. Due to a risk of serious complications, including stroke, you shouldn't take Aliskiren with ACE inhibitors or ARBs[6].

Additional medications sometimes used to treat high blood pressure:

If you're having trouble reaching your blood pressure goal with combinations of the above medications, your doctor may prescribe:

Alpha blockers:

These medications reduce nerve impulses to blood vessels, reducing the effects of natural chemicals that narrow blood vessels. Alpha blockers include doxazosin (Cardura), prazosin (Minipress) and others.

Alpha-beta blockers:

In addition to reducing nerve impulses to blood vessels, alpha-beta blockers slow the heartbeat to reduce the amount of blood that must be pumped through the vessels. Alpha-beta blockers include carvedilol (Coreg) and labetalol (Trandate).

Central-acting agents:

These medications prevent your brain from signalling your nervous system to increase your heart rate and narrow your blood vessels. Examples include clonidine (Catapres, Kapvay), guanfacine (Intuniv, Tenex) and methyldopa.

Vasodilators: These medications, including hydralazine and minoxidil, work directly on the muscles in the walls of your arteries, preventing the muscles from tightening and your arteries from narrowing.

Aldosterone antagonists: Examples are spironolactone (Aldactone) and eplerenone (Inspra). These drugs block the effect of a natural chemical that can lead to salt and fluid retention, which can contribute to high blood pressure.

To reduce the number of daily medication doses you need, your doctor may prescribe a combination of low-dose medications rather than larger doses of one single drug. In fact, two or more blood pressure drugs often are more effective than one. Sometimes finding the most effective medication or combination of drugs is a matter of trial and error[6].

Prevalence and Associated Risk Factors of Hypertension:

Raised blood pressure is a major risk factor for chronic heart disease, stroke, and coronary heart disease. Elevated BP is positively correlated to the risk of stroke and coronary heart disease. Other than coronary heart disease and stroke, its complications include heart failure, peripheral vascular disease, renal impairment, retinal haemorrhage, and visual impairment.

It is a silent killer as very rarely any symptom can be seen in its early stages until a severe medical crisis takes place like heart attack, stroke, or chronic kidney disease. Since people are unaware of excessive blood pressure, it is only through measurements that detection can be done. Although majority of patients with hypertension remain asymptomatic, some people with HTN report headaches, light-headedness, vertigo, altered vision, or fainting episode[7].

Adverse Effects Associated with the Use of Antihypertensive Drugs:

1. Thiazide diuretic:

Erectile dysfunction is adverse effect of the thiazide-class diuretics, and physicians should inquire specifically regarding its occurrence in conjunction with treatment with these drugs. Gout may be a consequence of the hyperuricemia induced by these diuretics. Hydrochlorothiazide may cause rapidly developing, severe hypernatremia in some patients. Thiazide diuretics have been associated with changes in plasma lipids and glucose tolerance that have led to some concern. The clinical significance of the changes has been disputed.

2. Angiotensin-converting Enzyme Inhibitor:

Severe hypotension can occur after initial doses of any ACE inhibitor in patients who are Hypovolemic due to diuretics, salt restriction, or gastrointestinal fluid loss. Other adverse effects Common to all ACE inhibitors include acute renal failure, hyperkalaemia, dry cough sometimes accompanied by wheezing, and angioedema. Captopril, particularly when given in high doses to patients with renal insufficiency, may cause neutropenia or proteinuria. Minor toxic effects seen more typically include altered sense of taste, allergic skin rashes, and drug fever, which may occur in as many as 10% of patients.

3. Angiotensin II receptor blocker:

Infrequent ADRs associated with therapy include: first dose orthostatic hypotension, rash, diarrhoea, dyspepsia, abnormal liver function, muscle cramp, myalgia, back pain, insomnia, decreased haemoglobin levels, renal impairment, pharyngitis, and/or nasal congestion.

The Adverse effects include hypotension, hyperkalaemia, and reduced renal function, including that associated with bilateral renal artery stenosis and stenosis in the artery of a solitary kidney. Hypotension is most likely to occur in patients in whom the blood pressure is highly dependent on angiotensin II, including those with volume depletion, renovascular hypertension, cardiac failure, and cirrhosis; in such patients initiation of treatment with low doses and attention to blood volume is essential. Hyperkalaemia may occur in conjunction with other factors that alter K + homeostasis, such as renal insufficiency, ingestion of excess K+ , and the use of drugs that promote K+ retention .

4. Beta-blocker:

Adverse drug reactions associated with the use of beta blockers include: nausea, diarrhoea, bronchospasm, dyspnoea, cold extremities, exacerbation of Raynaud's syndrome, bradycardia, hypotension, heart failure, heart block, fatigue, dizziness, abnormal vision, decreased concentration, hallucinations, insomnia, nightmares, clinical depression, sexual dysfunction, erectile dysfunction and/or alteration of glucose and lipid metabolism.

5. Calcium channel blocker:

The most common side effects caused by the Ca2+ channel antagonists, particularly the dihydropyridines, are due to excessive vasodilatation. Symptoms include dizziness, hypotension, headache, flushing, digital dysesthesia, and nausea. Patients also may experience constipation, peripheral oedema, and coughing, wheezing, and pulmonary oedema. Nimodipine may produce muscle cramps when given in the large doses required for a beneficial effect in patients with subarachnoid haemorrhage. Less common side effects include rash, somnolence, and occasional minor elevations of liver function tests. These side effects usually are benign and may abate with time or with dose adjustment. Worsened myocardial ischemia has been observed in two studies with the dihydropyridine nifedipine[8].

Drugs	**Adverse drug reactions**
Calcium channel blockers	
Amlodipine	Pedal oedema , Oedema,
	Headache, abdominal pain,
	Swelling of face, Giddiness
Nifidepine	Bradycardia
Beta-blockers	

Atenolol	Hypotension, Giddiness,
	Headache , Bradycardia
Metoprolol	Impotence, Bronchospasm,
	Irritation over whole body
Nebivolol	Pedal oedema
ACE Inhibiters	
Ramipril	Dry cough
Enalapril	Dry cough
Telmisartan	Dry cough
Furosemide	Hypotension, Bradycardia
Hydrochloro-thiazide	Muscle cramps, Headache,
	Vertigo , Pain in legs
Prazosin	Headache, Postural hypotension

The extent of potential antihypertensive drug interactions:

Adverse drug events (ADEs) are one of the most frequent and costly consequences of medical errors occurring in up to 40% of patients on five or more medications. Costs of drug-related morbidity exceed $177 billion and lawsuits with financial judgments occurred with 56% when there was permanent disability.It has been estimated that 6% to 10% of ADE are due to drug interactions. Fifty percent to 84% of ADEs are preventable with proper identification and surveillance. Nearly all hospital and outpatient pharmacies have computer software or online services to detect drug interactions, yet many drug interactions go unresolved. Many drug interactions are insignificant and pharmacists over-ride up to 88% of online alerts. Most

interactions can be managed by appropriate monitoring and dosage adjustments and pharmacists frequently assume these adjustments are being done by the physician.

The Institute of Medicine report suggested that ADEs might be minimized by computer order entry that alerted physicians when there is a dosage error or drug interaction detected. However, if interaction alerts become so common that physicians ignore them, the utility of these programs is diminished.

The purpose of this article is to characterize potential drug–drug interactions with common medications used to treat hypertension and determine the frequency of potential interactions with one class of medications in a state Medicaid program[9].

Resistant hypertension:

Resistant hypertension is defined as failure to achieve goal blood pressure (BP) <140/90 mmHg (or <130/80 mmHg in patients with diabetes mellitus or chronic kidney disease) in patients with hypertension who are compliant with maximum tolerated doses of an appropriate antihypertensive drug regimen consisting of a minimum of 3 agents of different classes, including a diuretic.

Patients who meet the criteria for resistant hypertension but whose BP can be controlled on maximum tolerated doses of ≥4 antihypertensive agents are classified as having controlled resistant hypertension. Although the number of failed antihypertensive drugs required for the classification of resistant hypertension is arbitrary, this diagnosis identifies patients at high risk for having a potentially curable (secondary) form of hypertension, as well as those who may benefit from specific therapeutic approaches to lower BP.

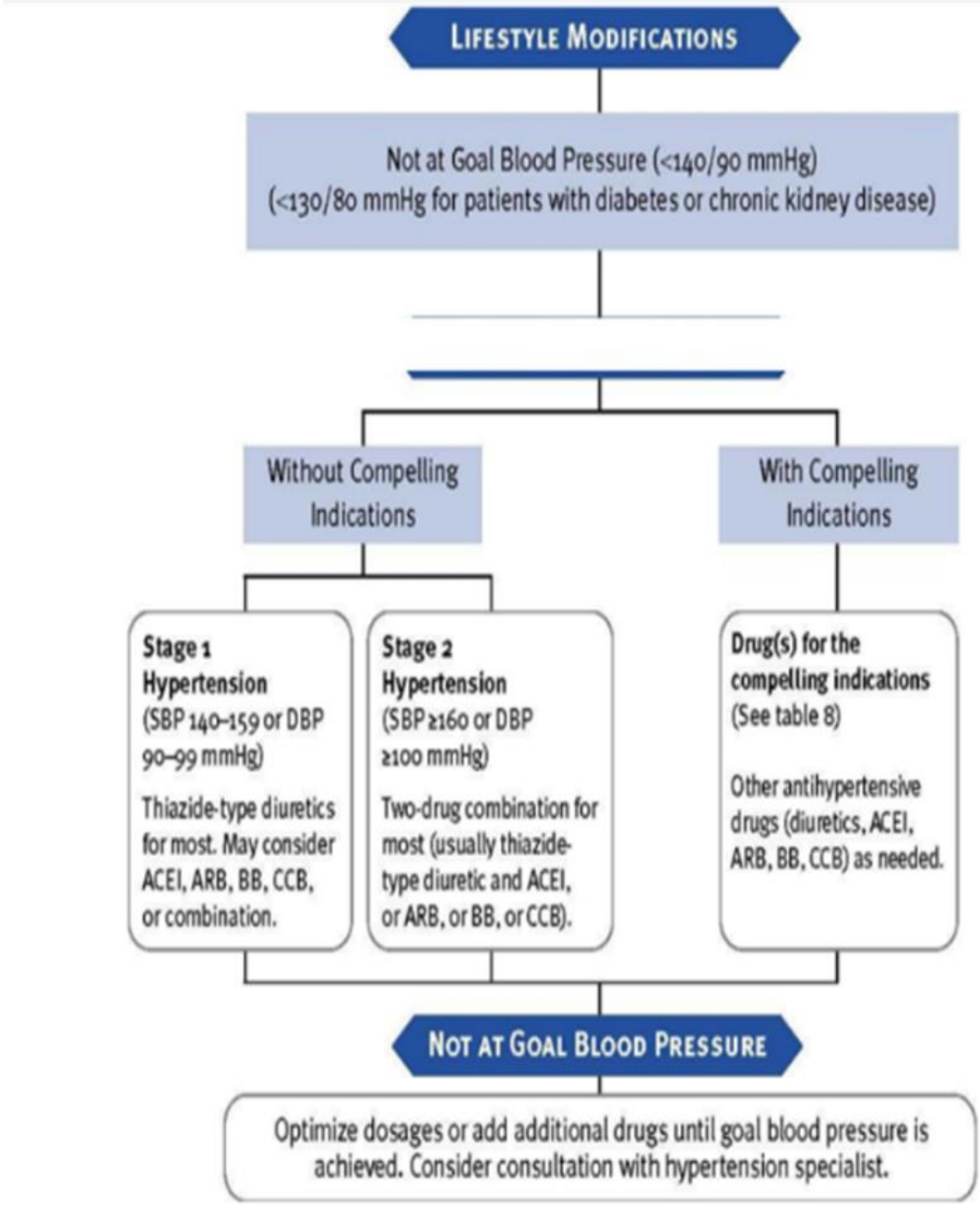
The term “resistant hypertension” indicates that the patient has true resistance to otherwise effective antihypertensive treatment and no other causes including improper blood pressure measurement, an inadequately prescribed antihypertensive regimen, failure to adhere to adequately prescribed therapy, or hypertension that is elevated in the office but normal at home (white coat hypertension).

The diagnosis of resistant hypertension implies that the causes of pseudo resistance (lack of BP control with treatment in a patient who does not have resistant hypertension) have been excluded with ambulatory blood pressure monitoring, assessment of adherence to a medical regimen, and other appropriate methods[10].

Hypertension is the leading non communicable disease risk attributing to morbidity and mortality. In India, hypertension is a significant non communicable disease risk attributing to 10% of all deaths. Hypertension attributes to 10% of ischemic heart disease, 21% of peripheral vascular disease, 24% of Acute MI, and 29% of Strokes. The overall prevalence for hypertension in India was estimated to be 29.8% .Appropriate management of hypertension can bring down the incidence of these conditions. With the increasing prevalence of hypertension, there is an increase in the use of antihypertensive drugs, which to a far extent can improve the quality of life and decrease the attributed morbidity and mortality.

Thus, appropriate use of antihypertensive drugs in a society, in an efficient manner is an utmost requirement. Further there is also a requirement for educating the people about hypertension and the consequences of its inadequate management, and also for implementing strategies for prevention as well[11].

Blood pressure drugs work in several ways, such as removing excess salt and fluid from the body, slowing the heartbeat or relaxing and widening the blood vessels. A wide range of antihypertensive drugs belonging to different pharmacological classes is available. Choice of drugs for a particular patient changes because of factors such as efficacy, side effects, cost, and development of newer drugs. Hence, it is necessary to survey prescription patterns as a component of medical audit for monitoring, evaluation, and necessary modifications in prescribing practices to achieve rational and cost-effective medical care[12].


LIFESTYLE MODIFICATIONS
Not at Goal Blood Pressure (<140/90 mmHg)
(<130/80 mmHg for patients with diabetes or chronic kidney disease)
Without Compelling Indications
With Compelling Indications
Stage 1 Hypertension (SBP 140–159 or DBP 90–99 mmHg)
Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.
Stage 2 Hypertension (SBP ≥160 or DBP ≥100 mmHg)
Two-drug combination for most (usually thiazide-type diuretic and ACEI, or ARB, or BB, or CCB).
Drug(s) for the compelling indications (See table 8)
Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.
NOT AT GOAL BLOOD PRESSURE
Optimize dosages or add additional drugs until goal blood pressure is achieved. Consider consultation with hypertension specialist.

1. **Supratim Datta (2017)**[13] conducted a study on utilization pattern of antihypertensive in a South Indian tertiary care teaching hospital and adherence to standard treatment guidelines. This study reported that calcium channel blockers were the most frequently used antihypertensive class of drugs (72.3%). Amlodipine (55.6%) was the single most frequently prescribed antihypertensive agent and adherence to the National List of Essential Medicine was 65%. The treatment pattern conformed to standard treatment guidelines.
2. **Renoy Philip et al (2016)**[14] conducted a study on prescribing patterns of antihypertensive drugs in geriatric population in tertiary care hospital. This study reveals that 53.76% of cases were prescribed with monotherapy was calcium channel blocker and 46.23% by combination therapy was Telmisartan + Hydrochlorothiazide. Among antihypertensive drugs prescribed for treating geriatric patients who were suffering from prehypertension, most of the cases were prescribed with monotherapy followed by combination therapy.
3. **Zahra Eslampanah (2016)** [15] conducted a study on drug utilization evaluation of anti-hypertensive agents in a medical care hospital. This study reports only 6 major classes were used in the study sample. They were Diuretics (Ds), Calcium Channel Blockers (CCBs), Angiotensin Receptor Blockers (ARBs), Beta Adrenergic Blockers (BABs), Alpha Adrenergic Blockers (AABs) and Angiotensin Converting Enzyme Inhibitors (ACEIs). Diuretics were used the highest in 112 (40.14%) prescriptions and AABs in 7 (2.50%) prescriptions being the least. Evaluation and implementation of effective strategies can greatly aid in improving the quality use of anti-hypertensives.
4. **Madhav D Trivedi et al (2015)**[16] conducted a pharmacovigilance study of angiotensin-converting enzyme inhibitors given to hypertensive patients. Among 53 ADRs, 24 (4.80%) patients developed dry cough, 8 (1.60%) hypotension,2 (0.40%) headache, 2 (0.40%) dizziness, 3 (0.60%) nausea/bowel upset, 3 (0.60%)rashes, 2 (0.40%) developed angioedema, 3 (0.60%) dyspepsia, hyperkalemia, acute renal failure, proteinuria are rare. Incidence of ADRs by ACEIs with cough as the most common ADR followed by hypotension.
5. **Johan P.J et al (2015)**[17] have done study on pattern of antihypertensive drug utilization in a tertiary care hospital. The result shows that the current prescribing trend

for anti-hypertensive agents and it highlights certain important features in the existing prescribing practice. The pattern of antihypertensive medication in this hospital was rational and the JNC 7 guidelines were followed for treatment of hypertension.

6. **Karthikeyan G.D et al (2015)**[18] have done study on medication knowledge level of hypertensive patients. The result shows that insufficient knowledge of hypertensive patients about their medication could lead to non-adherence to therapy and low control of their blood pressure.
7. **Krishna M et al (2015)**[19] has done study on prescription pattern of anti hypertensive drugs in adherence to JNC-7 guidelines. The study concludes that hypertension is more prevalent in males than in females, with its prevalence increasing with age. Thiazides are the most frequently prescribed classes of drugs alone or in combination. Since the prevalence of hypertension depends upon ethnicity, genetic, environmental and physiological factors, therefore further research is critically needed to set up a rationale choice of medication on the basis of above mentioned factors.
8. **Nitin K.B et al (2015)**[20] have done study on adherence to JNC-7 and WHO-ISH guidelines of antihypertensive medications prescribed to hypertensive patients with co-morbid conditions. The study demonstrated that physicians are not completely adhering to standard guidelines while treating hypertension with co morbid conditions. It is evident that prescribing guidelines should be followed for better health outcome and improvement in quality of life of patients suffering from hypertension with co-morbidities.
9. **Pyarelal et al (2015)**[21] done a study of prescription pattern of antihypertensive drugs in tertiary care teaching hospital. The result shows hypertensive is more prevalent in male patients than female patients. ARBs and CCBs were the most common single drugs used for most of the uncomplicated essential hypertension followed by ACE inhibitors.
10. **Rama M.P et al (2015)**[22] have done study on drug utilization patterns of antihypertensive medication in a tertiary care hospital. Majority of drugs were prescribed by brand names on an average two drugs per prescription. CCBs were the most commonly used drugs to treat hypertension among all the age group patient population followed beta blockers, ARB, ACEI, diuretics, clonidine and prazosin. It was also found that there was less number of fixed dose combinations was prescribed.

The study suggests that there is immense scope of improvement in prescribing practices in the form of rational drug prescribing for achieving optimal blood pressure control.

11. **Vishal R et al (2015)**[23] have done study on antihypertensive drug prescription patterns, rationality and adherence result shows that in the monotherapy, category angiotensin receptors blockers (ARBs) accounted (24.8%), calcium channel blockers (CCBs) (19.4%), angiotensin converting enzyme inhibitors (ACEIs) (11%), beta blockers (BBs) (2.8%), and diuretics (2%) of the total prescription.
12. **Anand R.K et al (2014)** [24] has done study on a prospective study of prescribing pattern of antihypertensive drugs in tertiary care hospital. The most frequently prescribed antihypertensive drugs were ARBs (58%), CCBs (50%), beta blockers (15%), diuretics (14%). 68% received monotherapy while remaining 32% received combination therapy. The prescription pattern was found to be partly in accordance with JNC 7 guidelines.
13. **Geetha M et al (2014)**[25] conducted a study on drug utilization pattern of antihypertensive drugs among chronic kidney disease patients in a tertiary care hospital. The result shows that combination of diuretic and calcium channel blocker (80%) was commonly used in hypertensive patients with diabetic. Beta blocker because of its known adverse effects in diabetic patients (hypoglycaemic unawareness) is getting less commonly used than in non diabetic. Use of antihypertensive drugs such as selective beta blocker, alpha-blocker, calcium channel blocker combination (45%) more commonly used in non diabetic with hypertension.
14. **Mirza A.B et al (2014)**[26] done a study on prescribing pattern among hypertensive patients. The result shows a total of 1828 drugs were prescribed and the most commonly prescribed drugs were ARBs and ACE inhibitors. Rational prescribing requires consideration to dose, duration and interaction with other medications.
15. **Pavitra R.Y et al (2014)**[27] conducted a study on drug utilization pattern of antihypertensive drugs in chronic kidney disease patients in a tertiary care hospital. This study reports the combination of diuretic and calcium channel blocker (80%) was commonly used in hypertensive patients with diabetes. Uses of antihypertensive drugs

such as selective beta blocker, alpha blocker, calcium channel blocker combination (45%) were more commonly used in nondiabetic with hypertension.

16. **Anand K et al (2013)**[28] has done study on prescribing patterns of antihypertensive drugs in tertiary care hospital. The current prescribing trend for antihypertensive agents. It implies that calcium channel blockers are the leading group of antihypertensive agents followed by diuretics. The treatment of hypertension keeps changing and newer drugs are being added at a rapid pace. Further studies focused on the rationale for choice of drugs based on demographic data, economic status, associated conditions and complications would give additional insights into prescribing patterns in hypertension in India.
17. **Rubiya S et al (2013)**[29] have done study on drug use evaluation of antihypertensive medications in out patients in a secondary care hospital. The study indicates the necessity of preventive care for hypertension. Improving patient's knowledge on antihypertensive medications on all aspects will boost up the present health care in this setting.
18. **Ushadevi K.H et al (2013)**[30] have done study on drug use evaluation of antihypertensive medications in out patients in a secondary care hospital. The prevalence of monotherapy is higher than combination therapy. Most frequently prescribed monotherapy is calcium channel blockers and ACE inhibitors.
19. **Jainaf Nachiya et al (2013)**[31] conducted a study on drug utilization pattern of antihypertensive medications on out-patients and inpatients in a tertiary care teaching hospital. This study reports, ACE inhibitors were most frequently prescribed antihypertensive drugs (41.84%) and 24.0% beta blockers, 17.7% calcium channel blockers, 11.4% diuretics, 1.5% angiotensin II receptor antagonist were the other antihypertensives prescribed. ACE inhibitors were most frequently prescribed and amlodipine was highest consumed drug in the internal ward.
20. **Seema G et al (2012)**[32] conducted study on prescribing pattern of antihypertensive drugs in a tertiary care hospital. Majority of patients studied had stage 1 hypertension (37.2%), type 2 diabetes mellitus was the most common co morbidity observed in the patients (40%). Commonly prescribed antihypertensive group of drugs in decreasing

order of frequency were; ACE inhibitors and CCBs followed by beta-blockers, ARBs and diuretics.

21. **Khawaja T.M et al (2011)**[33] conducted study on rational use of beta blockers in management of hypertension. The result shows that the frequency of different beta blocker varies; Atenolol 48%, Propranalol 34% and Metoprolol 18% were prescribed. Beta blockers are very effective in controlling blood pressure in hypertensive patients. Beta blockers are mostly used as first line antihypertensive therapy.
22. **Salaman M.S et al (2010)**[34]have done study on management of hypertension in the end stage renal disease patient. The result shows that blood pressure control is not adequate in a vast majority of haemodialysis patients, which in turn translates into an elevated rate of cardiovascular disease.

Hypertension is a major chronic disease affecting portions of world population and uncontrolled hypertension leads to severe long term consequences such as stroke, heart failure, congestive heart disease (CHD), end stage renal disease (ESRD). It is also associated with chronic renal failure (CRF) and diabetes mellitus (DM).

Hypertension is estimated to affect 972 million adults worldwide, with 66% of those affected are from low and middle income countries, including India .The overall burden of hypertension related disease is rapidly rising in the developing world as a consequence of the aging population and increasing urbanization.

Poor management affects the morbidity and mortality of the patient and on the other hand pharmacological management is associated with many adverse effects like hypotension, GI disturbances, impaired sexual function etc. which adversely affects the quality of life of patients.

Drug utilization study is a component of medical audit that monitors and evaluates the prescribing practices and recommends necessary modifications to achieve rational drug use[35].

Antihypertensive drug therapy has evolved in past 60 years and now a number of drugs alone and in combinations are available for the control of blood pressure. The choice of an antihypertensive drug is based on efficacy, side-effects, effects on other systems and cost. Accordingly, there is a need to survey the pattern of usage of antihypertensive drugs, to see if the current usage is rational and in concordance with current guidelines for treatment of hypertension. The study of prescribing patterns is a component of medical audit which seeks monitoring, evaluation and necessary modifications in the prescribing practices of the prescribers to achieve rational and cost effective medical care[36].

A wide range of antihypertensive drugs belonging to different pharmacological classes are available such as Angiotensin Converting Enzyme inhibitors, Beta Blockers, Angiotensin Receptor Blockers, Calcium Channel Blockers, Diuretics, Alpha adrenergic blockers and central sympatholytics. Recommendations of various expert groups regarding choice of drugs are available as treatment guidelines to reduce practice variability, cost and improve rational pharmacotherapy. Implementation of these guidelines has been shown to be effective in raising quality of antihypertensive therapy[37].

The primary goal of antihypertensive therapy is to prevent morbidity and mortality associated with hypertension. Most patients with hypertension require two or more antihypertensive medications. Thiazide diuretics, β-blockers, angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers and calcium channel blockers have all been shown to reduce complications of hypertension and may be used for initial drug therapy.

The presence of concomitant disease also influences selection of antihypertensive drugs because two diseases may be treated with a single drug. For example ACEIs are particularly useful in hypertensive patients with evidence of chronic kidney disease, β-blockers and calcium channel blockers in those who also have angina, while diuretics, ACEIs, angiotensin receptor blockers and β-blockers are useful in those suffering from heart failure. The α-blockers are recommended in hypertensive men who have benign prostate hypertrophy. If a single drug does not adequately control blood pressure, drugs with different modes of action can be combined to effectively lower blood pressure while minimizing toxicity (stepped care).

Rational drug prescribing is defined as the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost. Measurement of drug use in health facilities not only describes drug use patterns and the behaviour of prescribers but also the extent of polypharmacy and the problems associated with it[38].

It is predominantly an asymptomatic condition and in more than 95% of cases, a specific underlying cause of hypertension cannot be found. Many risk factors may contribute to its development, including age, gender, weight, physical activity, smoking, family history, serum cholesterol, diabetes mellitus, renal dysfunction, peripheral resistance vessel tone, endothelial dysfunction, autonomic tone, insulin resistance and neurohumoral factors.

The overall principles common to these guidelines are to implement life style modifications in addition to pharmacotherapy to control BP in patients with hypertension. Patient's optimal adherence with antihypertensive drug therapy is essential for preventing serious complications with hypertension over the long term[39].

Apart from unhealthy lifestyles, lack of awareness about hypertension, distorted public health systems, physicians treating hypertension also lag behind in treating hypertension according to standard treatment guidelines. Non-compliance to antihypertensive therapy is also a reason for

uncontrolled hypertension. Elderly patients commonly have multiple pathologies leading to poly pharmacy, and altered pharmacokinetics and pharmacodynamics, are prone to adverse drug reactions from inappropriate medication[40].

Regular evaluation of the antihypertensive prescribing patterns are essential these days due to the growing epidemic of hypertension, increasing number of new antihypertensive drugs and the increasing number of drug combinations that are introduced into the market each year together with alteration in guidelines. At present, physicians have different options to manage hypertension as there are numerous pharmacological agents[41].

Irrational prescription of drugs is a common occurrence in clinical practice. Monitoring of prescription components can identify problems while prescribing and provide feedback to prescribers[42].

Several guidelines have been developed worldwide for the management of hypertension, and these serve as reference standards for clinical practitioners. However, many clinicians practice their own prescribing pattern in treating hypertensive patients according to their clinical experience. Primary care physicians need to be empowered in appropriate and evidence-based management of hypertension. A review of these prescribing patterns and guideline-based use of antihypertensive medications can give better insights into the concept of personalised, yet cost-effective pharmacological management of hypertension[43].

- To assess the drug utilization pattern of antihypertensives in the prescription.
- To identify the risk factors of hypertension.
- To identify the drug interactions in the prescriptions.

The entire study was planned to be carried out for a period of ten months from November 2017 - August 2018. The proposed study was designed in four different phases to achieve the objectives.

PHASE 1:

- Literature review
- Preparation of protocol
- Obtaining consent from the hospital ethical committee.

PHASE II:

- Preparation of patient consent form.
- Designing of structured data entry format.
- Designing of patient information leaflet.
- Data collection.
- Documentation of collected data using the data entry format.

PHASE III:

- Analysis of all collected data.
- Graphical representation of the data.
- Interpretation of the data.

PHASE IV:

- Preparation of the project report and submission to the study department.

STUDY SITE

The proposed work entitled: "Study on drug utilization pattern of anti - hypertensives in a tertiary care teaching hospital" was carried out in a 750 bedded multi-speciality institution, one of largest hospitals in Coimbatore. The various specialities include General Medicine, Anaesthesiology, Orthopaedics, Radiology, Nephrology, Pulmonology and critical care, cardiology, cardiothoracic Surgery, Microbiology, Pathology, Haematology, Laparoscopic surgery, ENT, Dental and Maxillofacial Surgery, Neurology, Ophthalmology, Physical Medicine and rehabilitation Diabetology, Surgical Gastro Enterology, Oncology. The hospital is also equipped with the modern diagnostic facilities like CT scan, MRI scan, ultrasound Sonography, Digital Subtraction Angiography (DSA), ECG, Treadmill, Colour Doppler etc. The hospital also has twelve hi-tech operation theatres, Intensive care unit. Intensive cardiac unit, Intensive pulmonary care unit, Catheterization, Balloon Valvoplasty, Coronary stenting, Kidney Transplantation units with Haemodialysis machines and an assisted Reproductive Technology Centre.

DEPARTMENT SELECTED FOR STUDY IN THE HOSPITAL

The department selected for the study was General Medicine department. The reason for selection of this department was that the patients pertaining to the study were admitted here. Pharmacy Practice Department provides services to the general medicine department and a good cooperation from the medical team added up to the reason for selecting this department for conducting the study.

CONSENT FROM HOSPITAL AUTHORITIES

The protocol of the study includes the scope of the study, literature review, objectives, methodology and outcome. The protocol was presented to the members of ethical committee for approval and the authorisation from the dean to carry out the study was procured through his letter and the same is attached for the reference in the **[Annexure 1]**. The study was conducted with the expert guidance of senior and junior physicians of the study department. The students were allowed to utilize the hospital facilities to make a follow up of the cases, in the selected departments. The entire health care professionals were well informed through

Dean's official circular.

LITERATURE SURVEY

Literature survey was carried out regarding the different aspects that should be considered while doing a study based on anti-hypertensive therapy. These include risk factors, prescribing patterns, adverse effects, and drug interactions and also ensuring the benefits of patient counselling. The literature supporting the study was gathered from various journals.

Study Site: General Medicine department

Study Design: Prospective observational study

Study Duration: 10 months (November 2017 - August 2018)

Sample Size: 102 patients

PATIENT SELECTION

Inclusion Criteria: Patients aged > 18 yrs age of either sex admitted to general medicine department diagnosed with hypertension are included in this study.

Exclusion Criteria: Patients not willing to participate in the study and in those where enough medical records are not available are excluded from the study.

PATIENT INFORMATION FORM

A patient information form was prepared to inform the patient or the care givers about the purpose and necessity of the study. The patients were assured that the confidentiality will be strictly maintained. The model of the information form is given in [**Annexure 2]** for the reference**.**

PATIENT CONSENT FORM

A patient consent form has been prepared and written consent was obtained from the patient/caregivers. The format contains details like address, date, place, provision for signature of the patient or caregivers, investigator and supervisor. The same is given in the [**Annexure**

No. 3] for reference.

DATA ENTRY FORMAT

A specially designed data entry format **[Annexure No.4]** was used to enter all patient's details like patient name, age, sex, date of admission, date of discharge, and reason for admission, past medical history, medication history, social history, vital signs like temperature, BP, pulse.

Provision is given in the format to enter laboratory investigations like blood sugar level(FBS,PPS,RBS), blood counts (Hb, TLC,ESR, platelet count, clotting time, bleeding time, liver function test, renal function test, electrolytes, urine examination, diagnosis, co-morbidities associated, drugs prescribed, drug interactions, adverse effects and any interventions.

METHODS AND MATERIALS:

A prospective observational study was planned to be conducted for a period of 8 months in the inpatient department of General Medicine of a tertiary care teaching hospital after getting approval from the hospital ethical committee.

The relevant data were collected on the day of admission in a specially designed data entry form, which includes patient demographics (age, sex and outcome of the patients), diagnosis, investigations, and drug details, duration of therapy and details of any concomitant medications. The laboratory data were noted down on follow-up.

For assessing the drug utilization pattern, individual prescriptions were screened and drugs were classified into different groups based on their category. Risk factors were identified from the data collected from the patient's case record. Drug interactions were identified using the Micromedex drug data base.

REPORT SUBMISSION

The reports on the study were prepared and the same was submitted to the study department.

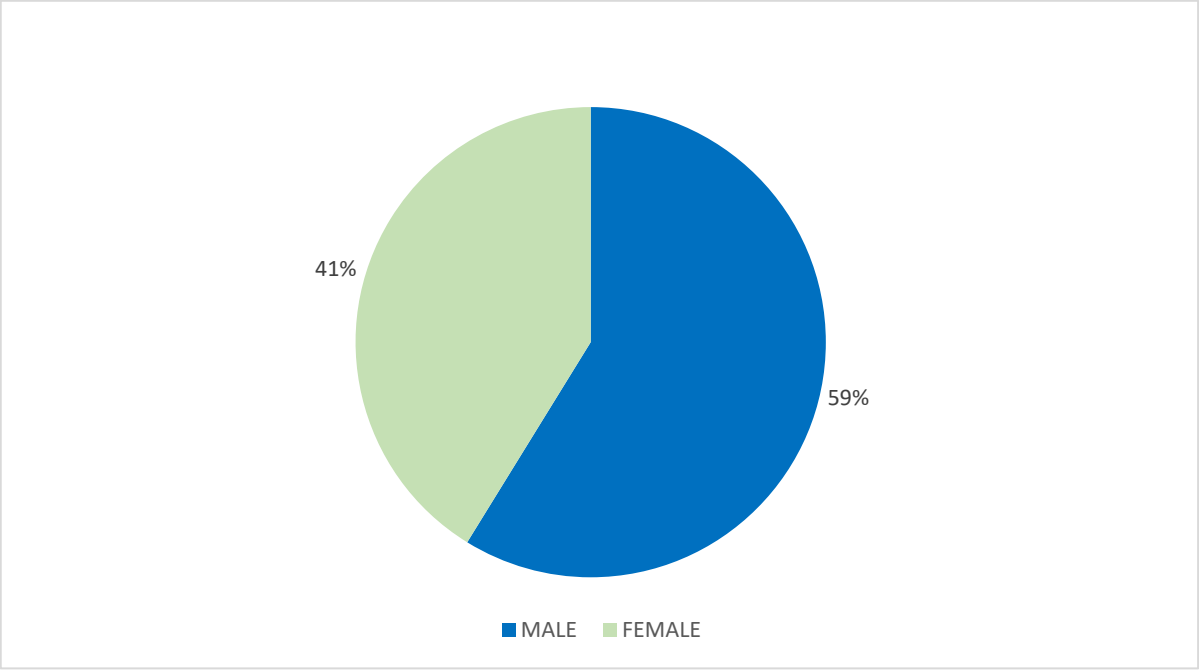
TABLE NO.1

GENDER CATEGORIZATION

(n=102)

SEX	NO. OF PATIENTS	PERCENTAGE %
Male	60	58.8
Female	42	41.2

FIGURE NO.1



The study reveals that 60(58.8%) patients were males and 42(41.2%) were females patients.

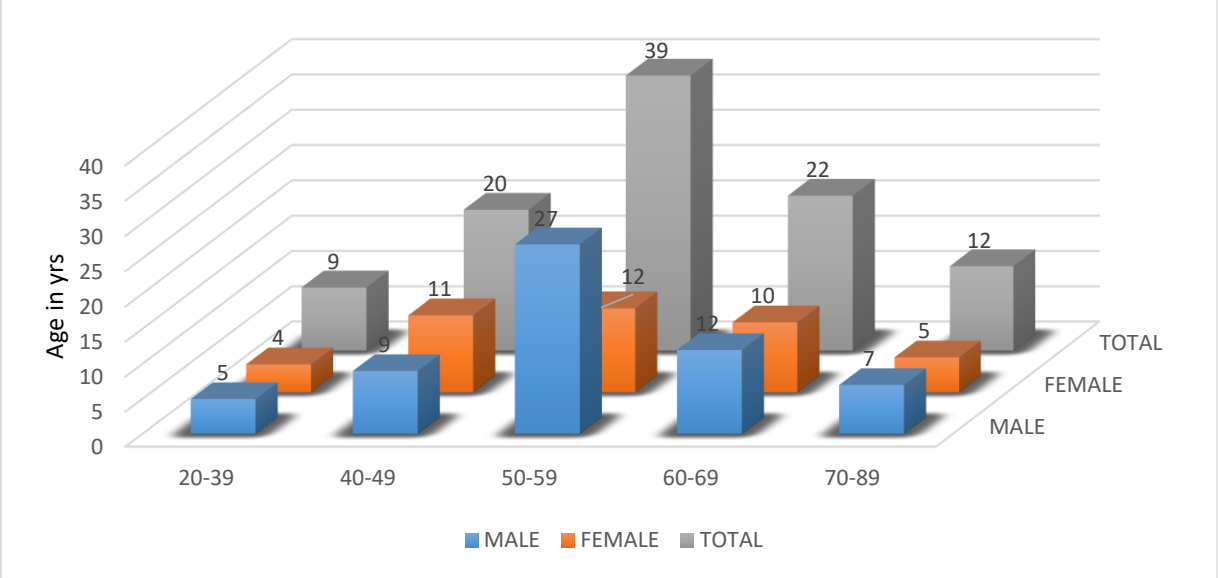
TABLE NO.2

AGE DISTRIBUTION

(n=102)

SI.NO	AGE (YEARS)	MALE (n=60)	FEMALE (n=42)	NO.OF PATIENTS	PERCENTAGE %
1	20-39	5	4	9	8.8
2	40-49	9	11	20	19.6
3	50-59	27	12	39	38.2
4	60-69	12	10	22	21.6
5	70-89	7	5	12	11.8

FIGURE NO.2



The study reveals that the majority of the patients 39(38.2%) were in the age group of 50-59 years followed by 22(21.6%) were in 60-69 years,20(19.6%) were in 40-49 years,12(11.8%) were in 70-89 years and 9(8.8%) were in 20-39 years.

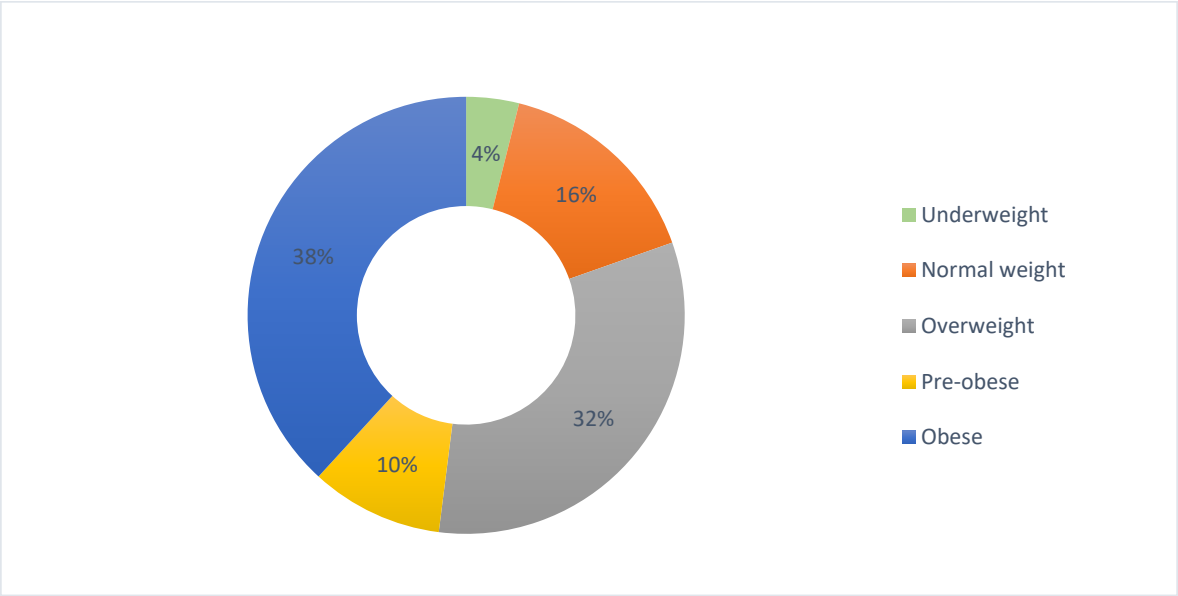
TABLE NO.3

BMI RANGE

(n=102)

CATEGORY	BMI RANGE (KG/M2)	NO.OF PATIENTS	PERCENTAGE %
Underweight	Less than 18	4	3.9
Normal weight	19-25	16	15.7
Overweight	25-30	33	32.4
Pre-obese	30-40	10	9.8
Obese	Over 40	39	38.2

FIGURE NO.3



The study shows that majority people of the study group were in obese category 39(38.2%), followed by overweight 33(32.4%), normal weight 16(15.7%), pre obese 10(9.8%) and underweight 4(3.9%).

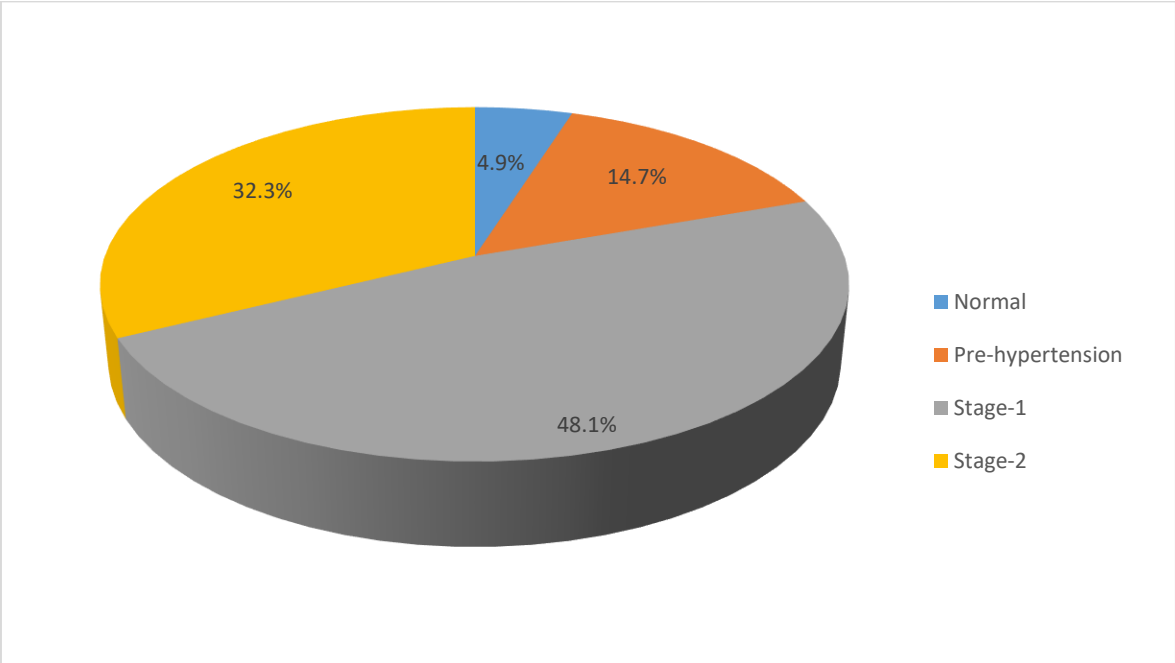
TABLE NO.4

CLASSIFICATION OF HYPERTENSION BY JNC 7

(n=102)

CLASSIFICATION	NO.OF PATIENTS	PERCENTAGE %
Normal	5	4.9
Pre-hypertension	15	14.7
Stage-1	49	48.1
Stage-2	33	32.3

FIGURE NO.4



The study revealed that 49(48.1%) of patients were in stage 1 hypertension followed by 33(32.3%) of patients in stage 2 hypertension and 15(14.7%) of patients in pre-hypertension.

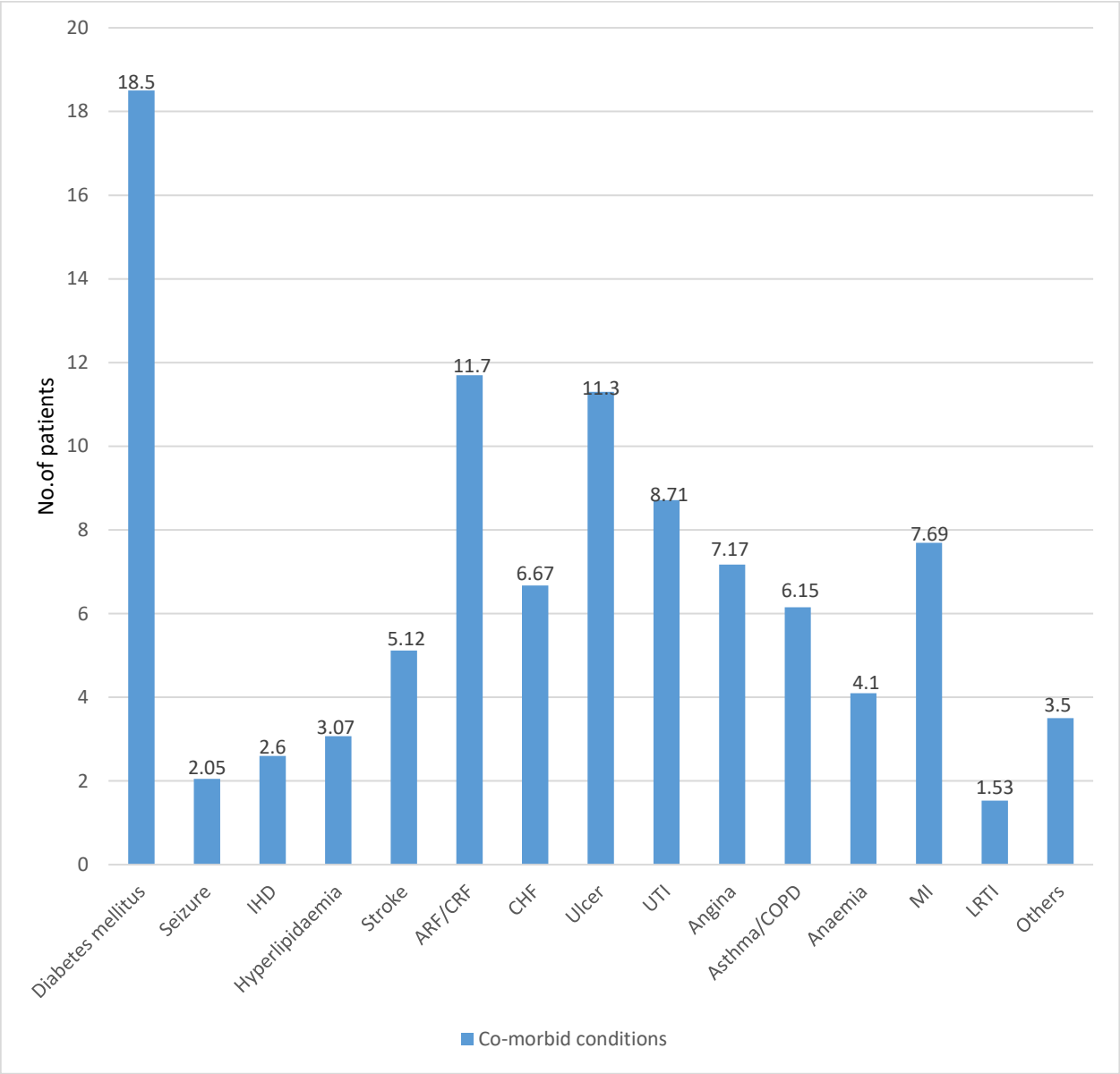
TABLE NO.5

CO MORBIDITIES

(n =195)

NO.	CO MORBIDITIES	NO. OF PATIENTS	PERCENTAGE %
1.	Diabetes mellitus	36	18.5
2.	Seizure	4	2.05
3.	IHD	5	2.6
4.	Hyperlipidaemia	6	3.07
5.	Stroke	10	5.12
6.	ARF/CRF	23	11.7
7.	CHF	13	6.67
8.	Ulcer	22	11.3
9.	UTI	17	8.71
10.	Angina	14	7.17
11.	Asthma/COPD	12	6.15
12.	Anaemia	8	4.10
13.	MI	15	7.69
14.	LRTI	3	1.53
15.	Others	7	3.5

FIGURE NO.5



The study reveals that the maximum number of the study population was suffering from diabetes mellitus 36(18.5%) followed by 23(11.7%) chronic renal failure and other disorders.

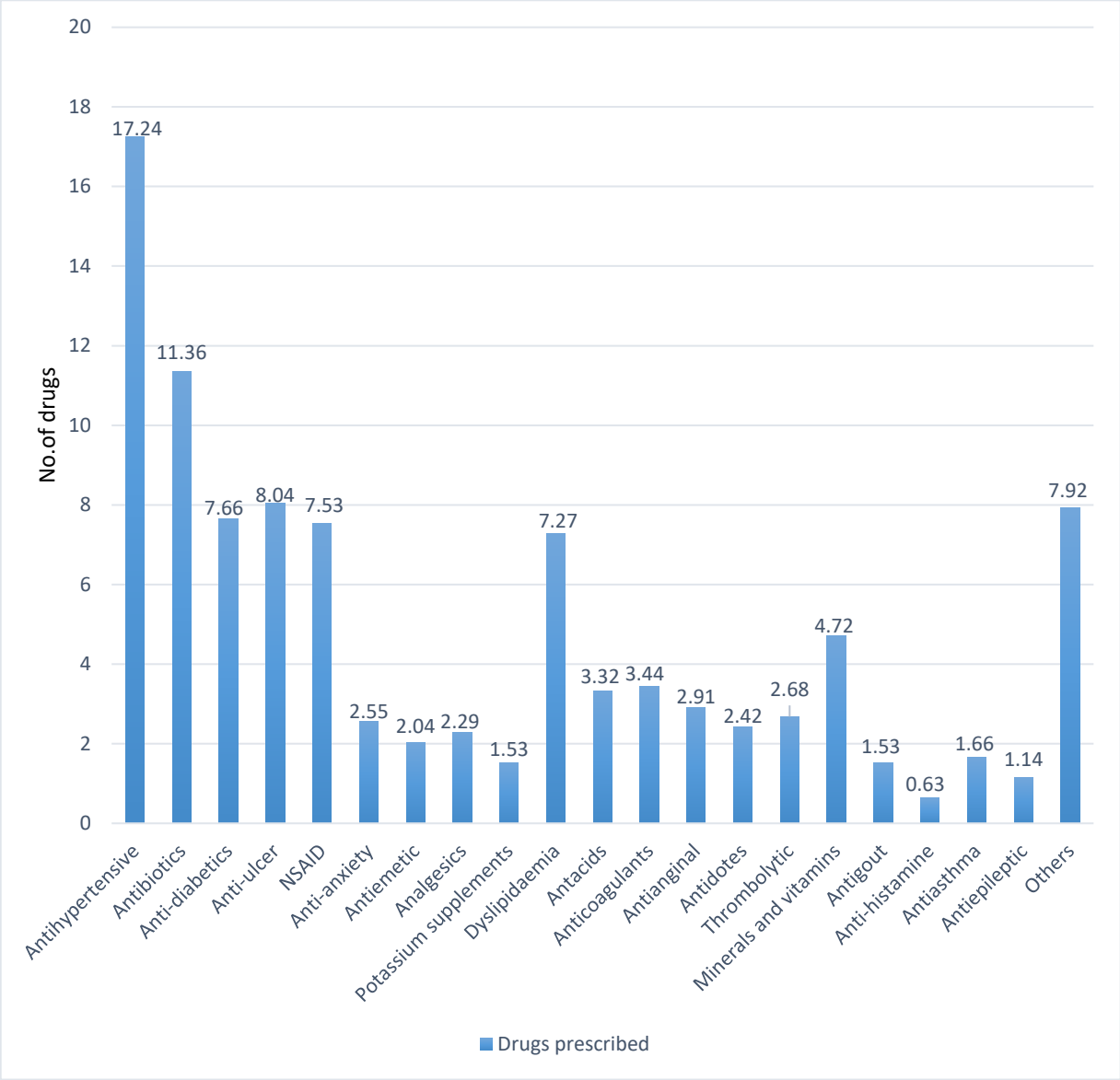
TABLE NO.6

DRUGS PRESCRIBED

(n=783)

S.NO	CATEGORIES OF DRUGS	NO. OF DRUGS	PERCENTAGE %
1.	Antihypertensive	135	17.24
2.	Antibiotics	89	11.36
3.	Anti-diabetics	60	7.66
4.	Anti-ulcer	63	8.04
5.	NSAID	59	7.53
6.	Anti-anxiety	20	2.55
7.	Antiemetic	16	2.04
8.	Analgesics	18	2.29
9.	Potassium supplements	12	1.53
10.	Dyslipidaemia	57	7.27
11.	Antacids	26	3.32
12.	Anticoagulants	27	3.44
13.	Antianginal	23	2.91
14.	Antidotes	19	2.42
15.	Thrombolytic	21	2.68
16.	Minerals and vitamins	37	4.72
17.	Antigout	12	1.53
18.	Anti-histamine	5	0.63
19.	Antiasthma	13	1.66
20.	Antiepileptic	9	1.14
21.	Others	62	7.92

FIGURE NO.6



The major categories of drugs in the prescriptions were anti-hypertensives (17.24%), followed by antibiotics (11.36%), anti-ulcer (8.04%), anti-diabetics (7.66%) and others.

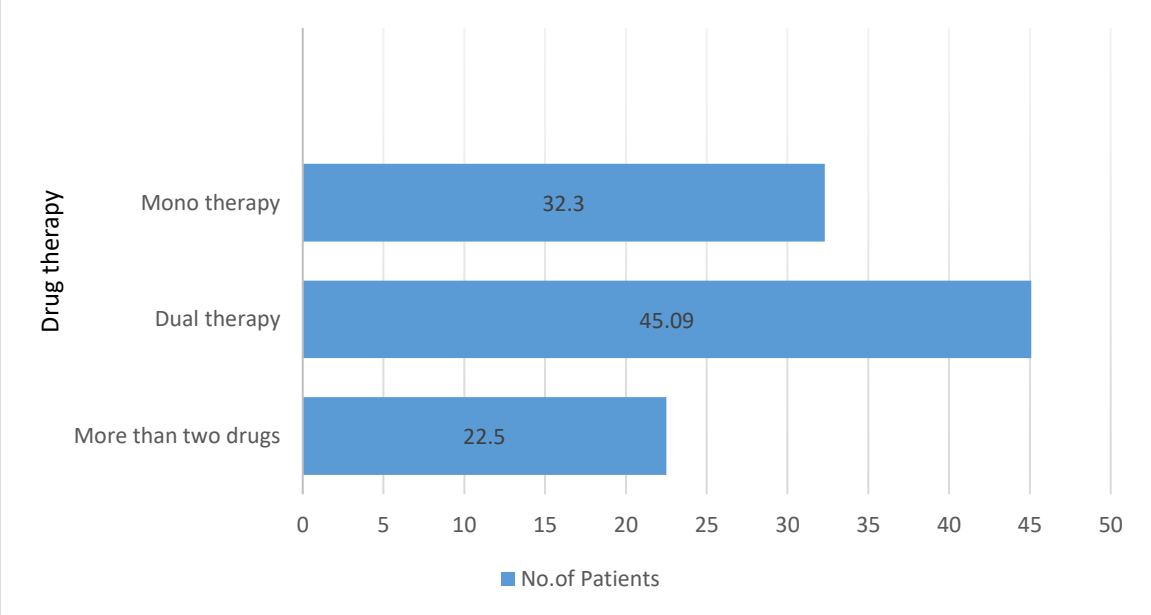
TABLE NO.7

DRUG THERAPY

(n = 102)

TYPE OF THERAPY	NO .OF PATIENTS	PERCENTAGE %
Mono therapy	33	32.3
Dual therapy	46	45.09
More than two drugs	23	22.5

FIGURE NO.7



The study shows that 46(45.09%) patients were taking dual therapy, 33(32.3%) patients were taking monotherapy and 23(22.5%) patients were taking more than two drugs.

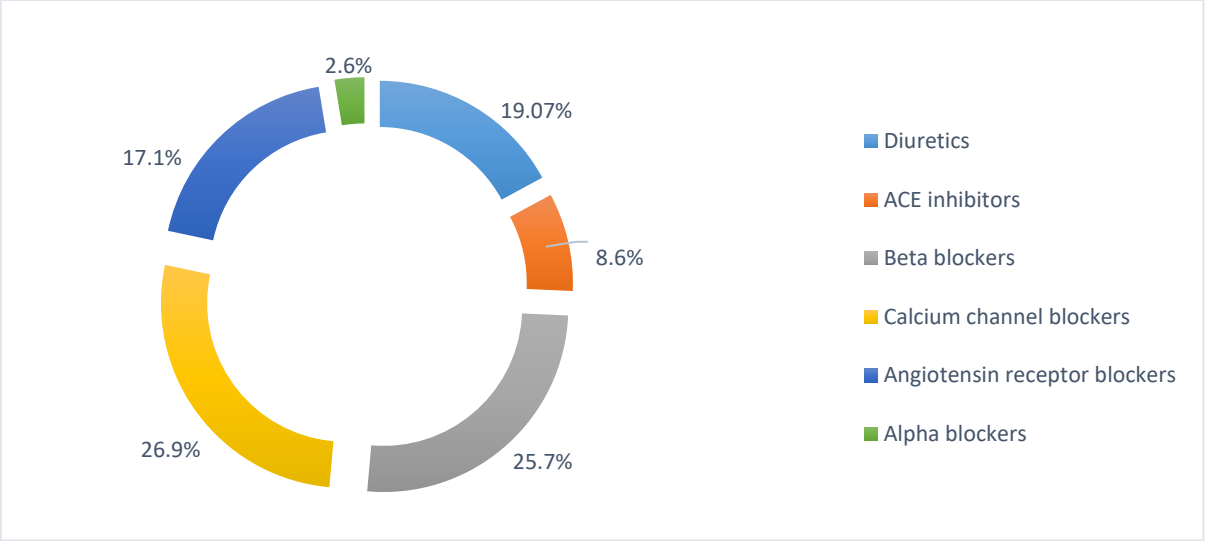
TABLE NO.8

ANTI-HYPERTENSIVES PRESCRIBED

(n=152)

CATEGORY	NO. OF DRUGS	PERCENTAGE %
Diuretics	26	17.1
ACE inhibitors	13	8.6
Beta blockers	39	25.7
Calcium channel blockers	41	26.9
Angiotensin receptor blockers	29	19.07
Alpha blockers	4	2.6

FIGURE NO.8



In this present study, calcium channel blocker 41(26.9%) were the most commonly prescribed antihypertensive agents followed by beta blockers 39(25.7%), angiotensin receptor blocker 29(19.07%), diuretics 26(17.1%), ACE inhibitors 13(8.6%), alpha blockers 4(2.6%).

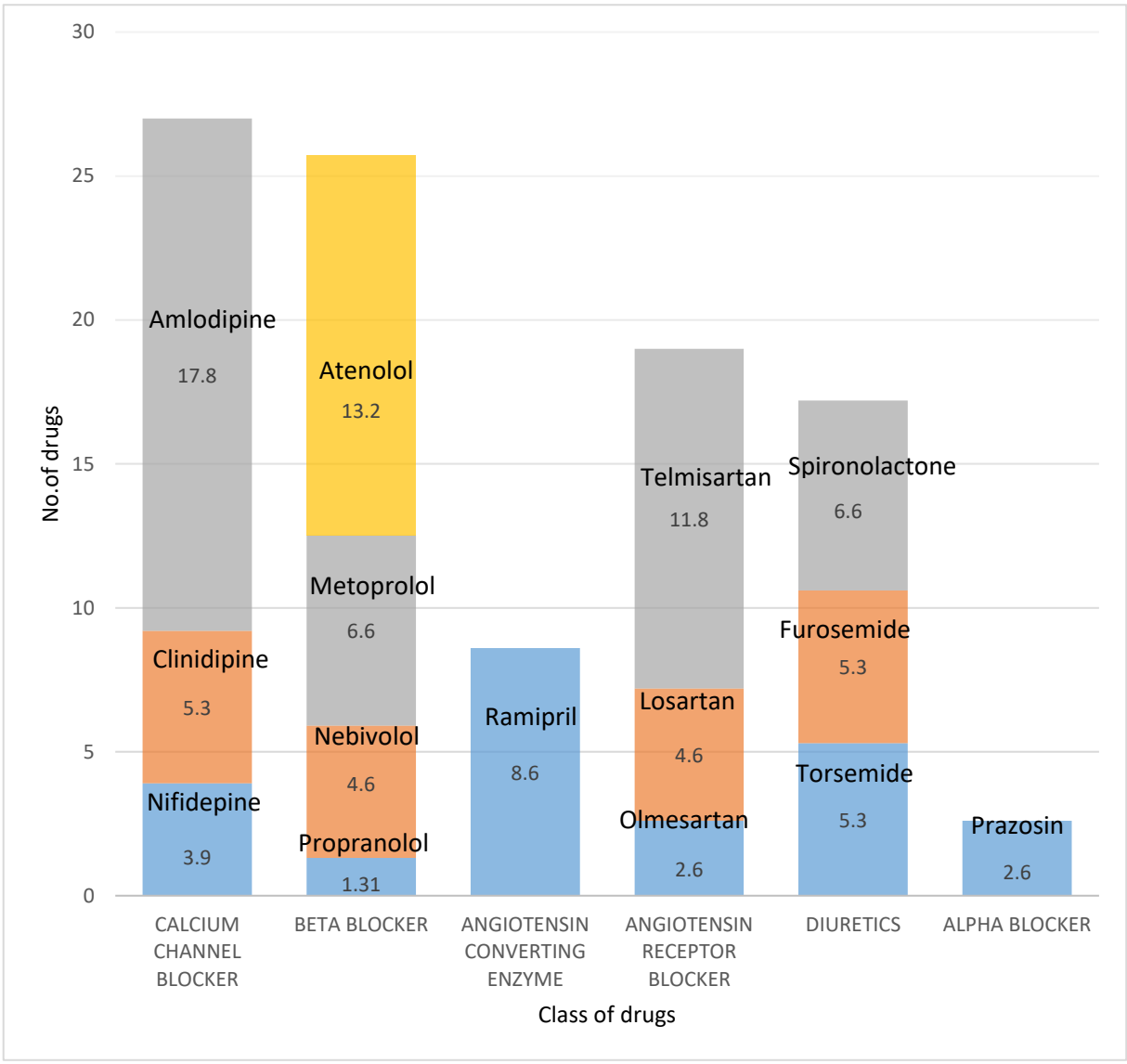
TABLE NO.9

ANTI-HYPERTENSIVES PRESCRIBED

(n= 152)

CLASS OF DRUGS	NAME OF DRUGS	NO. OF DRUGS	PERCENTAGE %
Calcium channel blocker (CCB)	Amlodipine	27	17.8
	Clinidipine	8	5.3
	Nifidepine	6	3.9
Beta blockers	Atenolol	20	13.2
	Metoprolol	10	6.6
	Nebivolol	7	4.6
	Propanalol	2	1.31
Angiotensin converting enzyme (ACE)	Ramipril	13	8.6
Angiotensin receptor blocker (ARB)	Telmisartan	18	11.8
	Losartan	7	4.6
	Olmesartan	4	2.6
Diuretics	Spironolactone	10	6.6
	Furosemide	8	5.3
	Torsemide	8	5.3
Alpha blockers	Prazosin	4	2.6

FIGURE NO.9



In this study, the most commonly prescribed drugs were Amlodipine 27(17.8%), Atenolol 20(13.2%), Telmisartan 18(11.8%), Ramipril 13(8.6%), Metoprolol 10(6.6%), Spironolactone 10(6.6%), Clinidipine 8(5.3%), Furosemide 8(5.3%), Torsemide 8(5.3%), Nebivolol 7(4.6%), Losartan 7(4.6%), Nifidepine 6(3.9%), Olmesartan 4(2.6%), Prazosin 4(2.6%), Propanalol 2(1.31%).

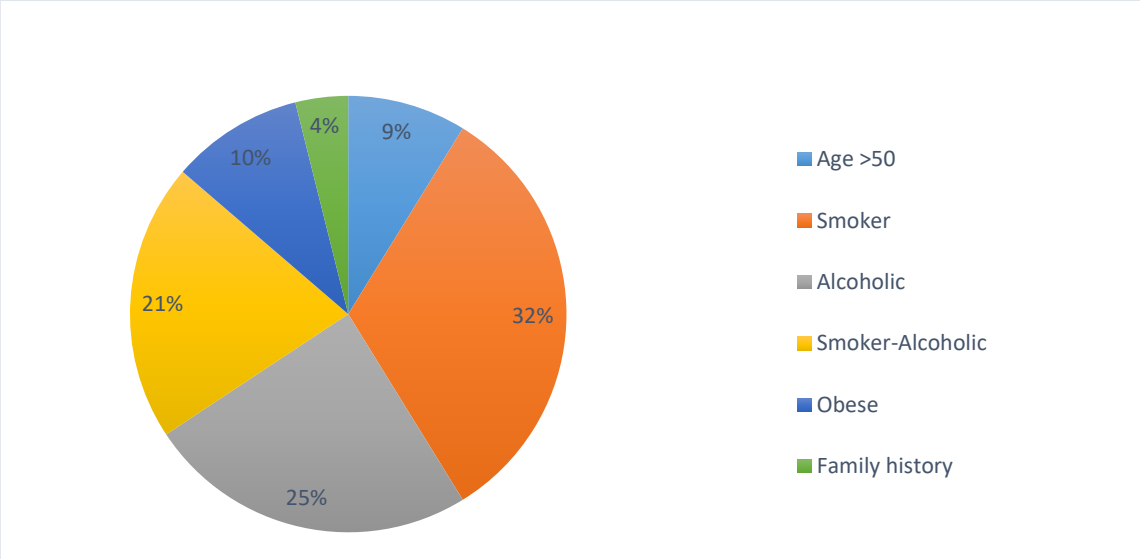
TABLE NO.10

RISK FACTOR

(n=102)

SI.NO	RISK FACTOR	NO.OF PATIENTS	PERCENTAGE %
1.	Age >50	9	8.8
2.	Smoker	33	32.4
3.	Alcoholic	25	24.5
4.	Smoker and Alcoholic	21	20.6
5.	Obese	10	9.8
6.	Family history	4	3.9

FIGURE NO.10



The study group shows that 33(32.4%) patients were smokers, 25(24.5%) patients were alcoholic, 21(20.6%) patients were both smoker and alcoholic, 10(9.8%) patients were obese, 9(8.8%) patients were in the age above 50 and 4(3.9%) patients were having family history of hypertension.

TABLE NO. 11

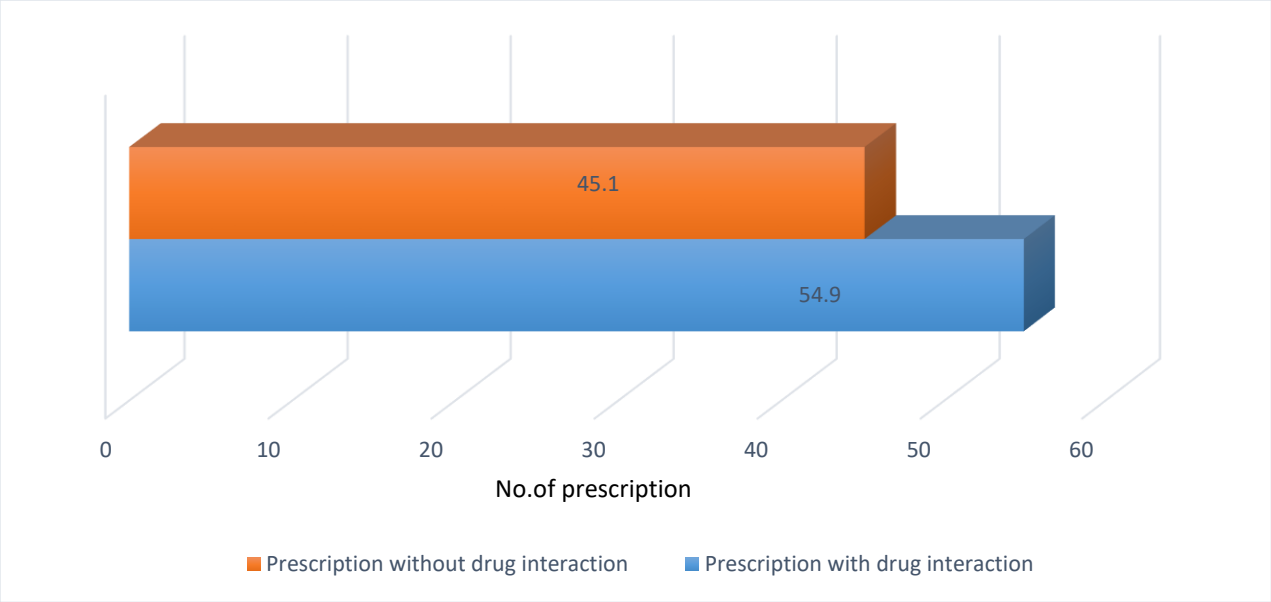
DRUG INTERACTIONS

(n=102)

PRESCRIPTION SCREENED	NO. OF PRESCRIPTION	PERCENTAGE %
Prescription with drug interaction	56	54.9
Prescription without drug interaction	46	45.1

FIGURE NO.11

DRUG INTERACTIONS



Out of 102 prescriptions, 54.9% of the prescription had drug interaction and 45.1% of the prescription had no drug interactions.

TABLE NO.12

DRUG DRUG INTERACTIONS

SI.NO	DRUGS EFFECTS	EFFECT	SEVERITY	MANAGEMENT
1.	Spironolatone+Telmisartan	Life threatening hyperkalemia	Major	Monitor serum k levels in patients with renal dysfunction
2.	Ramipril+Spironolactone	Hyperkalemia	Major	Monitor serum k levels for persistent elevation in patients with renal dysfunction
3.	Ramipril+Aspirin	Decreased ramipril effectiveness	Moderate	Clinician should weigh the benefits against the risks
4.	Ramipril+Diclofenac	Decreased antihypertensive effect	Moderate	Monitor patient for hyperkalemia or acute renal failure
5.	Metoprolol+Amlodipine	Hypotension/Bradycardia	Moderate	Monitor cardiac function carefully
6.	Amlodipine+Clopidogrel	Decrease response to clopidogrel	Moderate	It may decrease the effect of clopidogrel on platelet inhibition
7.	Amlodipine+Diclofenac	Increased risk of GI haemorrhage	Minor	The antihypertensive effects may be antagonized
8.	Atenolol+Aspirin	Decreased efficacy of atenolol	Minor	Monitor BP level
9.	Furosemide+Aspirin	Decreased efficacy of diuretics	Minor	Monitor BP level
10.	Digoxin+Spironolactone	Digoxin toxicity	Minor	Monitor BP level
11.	Aspirin+Spironolactone	Hyperkalemia	Minor	Monitor BP level
12.	Metoprolol+Aspirin	Decreased efficacy of metoprolol	Minor	Monitor BP level

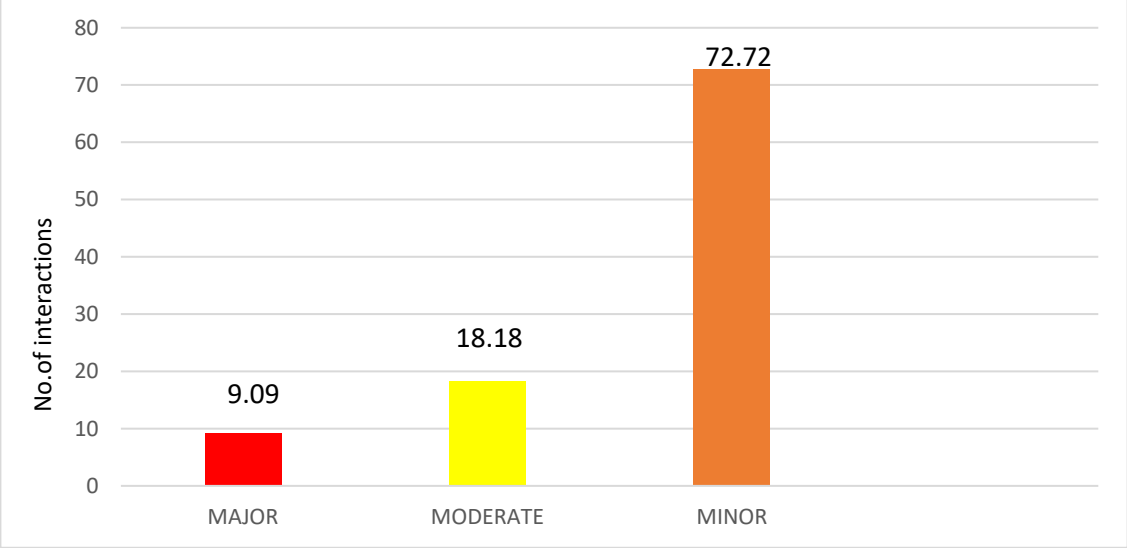
TABLE NO.13

SEVERITY OF DRUG INTERACTIONS

(n= 22)

SEVERITY	NUMBER OF INTERACTIONS	PERCENTAGE %
Major	2	9.09
Moderate	4	18.18
Minor	16	72.72

FIGURE NO.13



The study states that 9.09% of prescriptions had major drug interactions, 18.18% had moderate and 72.72% had minor drug interactions.

The study result reveals that the rate of hypertension in male patients was higher than that of female population [Table No.1]. A similar study was conducted by **Vikas Pandey et al (2014)**[44] reported that the proportion of males was on the higher side as compared with females.

The age categorization of the patients was analysed. Majority of the patients were in the age group of 50 years of age. [Table No:2].A study conducted by **Popuri Rupa Sindhu et al (2013)**[45] reported prevalence rates of hypertension among the people above 50 years of age were high.

From the weight and height data, the BMI (Body Mass Index) were calculated and categorized. It was observed most of the people of the study group were in obese category [Table No: 3].A similar study conducted by **Keneuoe Hycianth Thinyane et al** (2015)[46] reported that the maximum number of patients were in obese (54.3%) category.

The categorisation of patients depending on the JNC 7 classification revealed that more number of patients were in stage 1 hypertension [Table No: 4].A similar study was conducted by **Manasa Cidda et al (2014)**[47] revealed that the most of the patients were under the category of stage 1 hypertension 204(56.7%).

The co morbidity of the hypertensive patients was analysed. The study reveals that majority of the study population were suffering from diabetes mellitus [Table No: 5].A similar study conducted by **Giri D Rajasekhar et al (2015)**[48] also reported that most common comorbid condition among hypertensive population was diabetes mellitus. This report correlates with our study result.

The total number of antihypertensive agents utilized varies according to BP control achieved. The dual therapy was more widely used [Table No: 7].A similar study was done by **Ajmal Mankadavath et al (2014)**[49] reported that 47.5% in their study group were on dual therapy, which correlated with our results.

In this present study, calcium channel blocker were the most commonly prescribed antihypertensive agents [Table No: 8]. A similar study done by **Rachana PR et al**

(2014)[50]reported calcium channel blocker(41.97%) were most frequently used class of antihypertensive drugs.

The total numbers of antihypertensive prescribed drugs for the study population were found to be 152 and the most commonly prescribed drugs are Amlodipine [Table No: 9]. A similar study was done by **Rachana PR et al (2014)**[50] reported that Amlodipine (37.3%) were most frequently used class of antihypertensive drugs.

The analysis of hypertension risk factors shows that most of the patients were smokers [Table No: 10].A similar study conducted by **Arshad H Mohad et al (2012)**[51] reported that the prevalence of hypertension risk factors in the general population in which smoking were observed.

Through the current study, we could assess the drug utilization pattern of antihypertensive in general medicine department. This study has provided an insight into the prescription patterns of antihypertensive medications with respect to the level of BP control. It will help prescribers to pay more attention for specific factors that affect outcome of BP.

Studies from every now and then are required in drug utilization pattern and standard treatment guidelines to be circulated among prescribing clinicians. There is need of creating awareness about current management of hypertension to clinicians by organizing various workshops. Therefore educational strategies must be carried out to focus on utilisation of antihypertensive medications and overcoming individual risk factor. Also raising patient trust in their physicians may improve patient motivation to take prescribed medication.

The trend of hypertension is on the rise, if treated rationally this disease can be overcome. Patients too need to express their interest to know more about the drugs they have been prescribed, and this can promote a safe knowledge on their illness and special care, which would improve their quality of life.

The future studies can focus on the periodic monitoring of drug utilization pattern in hypertensive patients.

It should also focus on the control of the individual risk factor associated with patients such as smoking, alcohol, lifestyle, etc.

The prevalence of adverse events due to antihypertensive drug use can be studied in different group of diseases which can help in preparing guidelines on the antihypertensive therapy management.

Intervention of pharmacist in management of hypertension is very essential to prevent further complications. The guidelines for the use of antihypertensive should be reviewed and regularly updated.

1. WHO. What is drug utilization research and why it is needed? Introduction to Drug Utilization Research-World Health Organization; 2003:8-10.
2. D. Bhavika, V. Prasanna, B. Swathi. Drug utilization study of anti-hypertensive drugs in a tertiary care hospital. International Journal of Basic Clinical Pharmacology; 2016; 5(4):1580-1585.
3. DHMH/FHA/CMCH Maryland Family Planning & Reproductive Health Program Clinical Guidelines. Hypertension ;2013 : 1-3
4. National Institute for Health and Clinical Excellence. Hypertension- The clinical management of primary hypertension in adult. National Clinical Guideline Centre; 2011:12-15
5. http://shodh.inflibnet.ac.in/bitstream/123456789/171/2/02_introduction.pdf
6. Kavya SR. Hypertension: causes, prevention and treatment. Journal of Medical and Health Sciences;2015:1(4)
7. https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/diagnosis-treatment/drc-20373417
8. Shikha Singh, Ravi Shankar, and Gyan Prakash Singh· Prevalence and associated risk factors of hypertension: a cross-sectional study in urban Varanasi. International Journal of Hypertension ;2017:1(10):1-11
9. Vishal D.Joshi, Akash P.Dahake , Ashok P.Suthar, Vishal D.Joshi, Akash P.Dahake , Ashok P.Suthar. Prescription patterns of antihypertensive drugs in a tertiary care hospital in India. International Journal of PharmTech Research ;2010 ;2(1):10-13
10. Barry L. Carter Brian C. Lund Nobumasa Hayase Elizabeth Chrischilles. The extent of potential antihypertensive drug interactions in a Medicaid population. American Journal of Hypertension; 2002; 15(11): 953–95.
11. Robert M. Carey. Resistant hypertension. The American Heart Association; 2013 ; 6(1):746-750
12. Nilay D Solanki, Pratik Patel. Drug utilization pattern and pharmacoeconomic analysis of antihypertensive drugs prescribed in secondary care hospital in Gujarat, India. Asian Journal of Pharmaceutical and Clinical Research ;2017 ;10(3):120-124

13. Supratim Datta. Utilization study of antihypertensives in a South Indian tertiary care teaching hospital and adherence to standard guidelines. Journal of Basic and Clinical Pharmacy; 2017:33-37
14. Renoy Philip, Drisyamol K.A, Minu Mathew, Vennapusa Lakshmi Tanuja Reddy, Mahesh N.M and M.S. Krishnamurthy. Prescribing patterns of antihypertensive drugs in geriatric population in tertiary care hospital. International Journal of Pharmacological Research; 2016 ;6 (3):114-119
15. Zahra Eslampanah. Drug utilization evaluation of anti-hypertensive agents in a medical care hospital. International Journal of Pharmaceutical Sciences and Research ;2016; 7(2):862-867
16. Madhav D. Trivedi, Fenilkumar S. Kotadiya, Manish K. Bavaliya, Bhautik V. Tilva, Dimple S. Mehta. Pharmacovigilance study of angiotensin-converting enzyme inhibitors in patients visiting department of medicine of a tertiary care hospital, Surendranagar, Gujarat. International Journal of Basic & Clinical Pharmacology;2014 ; 3 (5): 870-873
17. John P et al; Pattern of antihypertensive drug utilization in a tertiary care hospital; Journal of Biology, Agriculture and Healthcare;2015:759-764
18. Karthikeyan et al. Medication knowledge level of hypertensive patients from South Indian hospitals. International Journal of Pharmaceutical Sciences and Drug Research;2015;7(3):279-283
19. Krishna Murti et al. Prescription pattern of antihypertensive drugs in adherence to JNC -7 guidelines. American Journal of Pharmacology and Toxicolgy;2015:384
20. Nitin Kothari et al. Adherence to JNC -7 and WHO-ISH guidelines of antihypertensive medications prescribed to hypertensive patients with comorbidities. Indian Journal of Physiological Pharmacology;2015;59(1):48-56
21. Pyarelal et al. A study of prescribing pattern of antihypertensive drugs in a tertiary-care teaching hospital. Indian Journal of Basic and Applied Medical Research; 2015;4(3):584-588
22. Rama M et al. Drug utilization patterns of antihypertensive medications in a tertiary care hospital. Journal of Evolution of Medical and Dental Sciences;2015;4(3)

23. Vishal R et al. Antihypertensive drug prescription pattern, rationality and adherence to JNC-7 hypertension treatment guidelines among Indian postmenopausal women;2015
24. Anand R K et al. A prospective study of prescribing pattern of antihypertensive drugs in tertiary care hospital Bangalore. Journal of Evolution of Medical and Dental Sciences;2014;2(52):10339-10344
25. Geetha et al. Drug utilization pattern of antihypertensive drugs in chronic kidney disease patients in a tertiary care hospital. International Journal of Medicine;2014:861-870
26. Mirza et al. A study on drug prescribing pattern in hypertensive patients in a tertiary care teaching hospital at Dhradun, Uttarakhand. International Journal of Medical Science and Public Health;2014;3(1):146-149
27. Pavitra et al. Drug utilization pattern of antihypertensive drugs in chronic kidney disease patients in a tertiary care hospital. International Journal of Dental and Medical Sciences;2014:1-10
28. Anand Kale et al. Prescribing pattern of antihypertensive drugs in a tertiary care hospital. Scholars Academic Journal of Pharmacy;2013:4206-4209
29. Rubiya et al. Drug use evaluation of antihypertensive medications in out patients in a secondary care hospital. International Journal of Integrative Medical Sciences;2013:441-446
30. Ushadevi et al. Drug use evaluation of antihypertensive medications in out patients in a secondary care hospital. Asian Journal of Pharmaceutical and Clinical Research;2013:244-248
31. Jainaf Nachiya, R. A. M , Parimalakrishnan S,Ramakrishna Rao M. Study on drug utilization pattern of antihypertensive medications on out-patients and inpatients in a tertiary care teaching hospital: a cross sectional study. African Journal of Pharmacy and Pharmacology;2015; 9(11):383-396
32. Seema Gupta et al. Prescribing pattern of antihypertensive drugs in a tertiary care hospital in Jammu-a descriptive study. JK Practitioner;2012;17(4):38-41
33. Khawaja et al. Rational use of beta blockers in management of hypertension. Journal of Pharmaceutical Sciences and Research;2011;3(1):1029-1034

34. Salman et al. Management of hypertension in the end stage renal disease patient; 2010;17(2):87-95
35. Anju Madhwar, Dharmender Gupta, Sujata Singh, N. A. Ansari. Study of drug utilization pattern of antihypertensive drugs in hypertensive nephropathy in a tertiary care teaching hospital, Bareilly, U.P. Indian Journal of Pharmacy and Pharmacology, 2015 ;2(1): 10-15
36. Ashok K. Sharma, Navdeep Dahiya, Jayant K. Kairi, Sandesh M. Bharati. Prescription patterns of antihypertensive drugs in a tertiary care hospital in India. International Journal of Basic & Clinical Pharmacology ;2015; 4 (1) :55-59
37. Bajaj J.k, Sood. M, Singh S.J and Jerath P. Prescription patterns of antihypertensive drugs and adherence to JNC 7guidelines in a tertiary care hospital in North India. International Journal of Medical and Clinical Research;2012 ;3(2) : 118-120
38. G.H. Rimoy, M. Justin-Temu and C. Nilay. Prescribing patterns and cost of antihypertensive drugs in private hospitals in Dar es Salaam, Tanzania. East Cent. Afr. J. Pharm. Sci;2008;11:69-73
39. Sai Sujana Surapaneni, Shaik Nasrin Arifa, Sahithi Venigalla, Haroled Peter PL, Ravindrababu Pingili and Siva Reddy Challa. An assessment of antihypertensive drug utilization patterns and adherence to JNC-7 guidelines in south Indian tertiary care teaching hospital. Indian Journal of Pharmacy Practice;2015;8(4) :177-182
40. Mohammed Altaf, Anas Rasheed, Arshia Mujtaba, Shaik Mohammed. Drug utilisation evaluation of antihypertensives in geriatric patients in a tertiary care hospital. International Journal of Pharmaceutical Sciences; 6(9): 261-264
41. Juno J. Joel, Nittu Daniel , Raghav Sharma, Shastry C.S. Drug utilization pattern of antihypertensives in a tertiary care hospital in south India. World Journal of Pharmacy and Pharmaceutical Sciences; 3(10): 1094-1099.
42. Manisha Nara and Lokesh Patil. A prospective observational study of prescription patterns of antihypertensive drugs in geriatric population in a tertiary care hospital. International Journal of Pharmacological Research ;2017; 7(1): 17-20
43. Noah Jarari Narasinga Rao et al. A review on prescribing patterns of antihypertensive drugs. Clinical Hypertension;2016; 22(7):1-8

44. Vikas Pandey, Ubedul Hoda, M. Aqil, M. Sharma, M. Akhtar, R. Khandelwal, Abul Kalam Najmi. Evaluation of prescribing patterns in diabetic and hypertensive patients in a South Delhi hospital. International Journal of Basic & Clinical Pharmacology; 2014; 3 (3):490-495
45. Popuri Rupa Sindhu, Malladi Srinivas Reddy. Study of Prescriptive Patterns of Antihypertensive Drugs in South India. International Journal of Advancements in Research &Technology; 2013; 2(6):295-311
46. Keneuoe Hycianth Thinyane, Tumelo Mothebe, Mopa Sooro, Lekotoane David Namole, Varsay Cooper. An observational study of hypertension treatment and patient outcomes in a primary care setting. Pan African Medical Journal ; 2015:1-10
47. Manasa Cidda, Uday Venkat Mateti, Murali Krishna Batchu, Srinivas Martha. Study of prescribing patterns of antihypertensives in South Indian population. International Journal of Basic & Clinical Pharmacology;2014; 3(2): 303-307
48. D.Giri Rajasekhar, D.Guru Prasanna, P.Chandrakanth. Prescribing pattern of antihypertensive drugs based on compelling indications with hypertension. International Journal of Pharmacy and Pharmaceutical Sciences;2016; 8(2): 72-75
49. Ajmal Mankadavath, Dilip Chandrasekhar, Tina Thomas, Fathimath Zuhra, Shanoob Kaipanthodi, Jafer Chalil Parambil. A prospective drug use evaluation of antihypertensive drugs in in-patients of a tertiary referral care hospital. Journal of basic and clinical physiology and pharmacology;2014:1-6
50. Arshad H Mohd, Uday V Mateti, Venkateswarlu Konuru, Mihir Y Parmar, Buchi R Kunduru. A study on prescribing patterns of antihypertensives in geriatric patients. Perspectives in Clinical Research;2012;3(4):139-142
51. Rachana P R, Anuradha H V, Shivamurthy M C. Anti-Hypertensive Prescribing Patterns and Cost Analysis for Primary Hypertension: a retrospective study. Journal of Clinical and Diagnostic Research; 2014;8(9)19-22

Sri Ramakrishna Hospital

Medical Service : M/s. S.N.R. SONS CHARITABLE TRUST

SRI RAMAKRISHNA HOSPITAL ETHICAL COMMITTEE

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Phone : 0422 - 4500000, 4500201, Grams :"RAMHOSP" Fax : 0422-2240521
E-mail : dean@snrsonstrust.org, website : sriramakrishnahospital.com
Ethics Committee Registration No. ECR/690/Inst/TN/2014

SRH/EC.12-12/2017-18 — 28th December 2017

ETHICAL CLEARANCE CERTIFICATE

Project Title:"Study On Drug Utilization Pattern Of Anti - Hypertensives In A Tertiary Care Teaching Hospital".

Researcher: MS.SARANYA V. A
M.Pharmacy II year
College of Pharmacy,
Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore – 641 044

The following members of the ethics committee were present at the meeting held on 23.12.2017 at 11.00am at New Auditorium, Sri Ramakrishna Hospital Campus, Coimbatore.

SI NO	Members Name	Qualification	Designation	Address	Affiliation To the Institution Yes/NO
1.	Dr.P.Murali	M.Sc.,Ph.D., D.Sc	Scientist Mg. Director & CEO	Mg.Director & CEO Evolve Biotech Pvt.Ltd., 401 – 405, 4th floor Ticel Bio park Ltd, Taramani, Chennai - 13	No
2.	Dr.P.Sukumaran	MS., M.Ch., FIACS	Scientific / EC Member Secretary Dean	Dean Sri Ramakrishna Hospital, 395, Sarojini Naidu Road, Sidhapudur, Coimbatore	Yes
3.	Dr.R.Lalitha	DGO.,(OG)	Clinician	Sr.Consultant Gynecologist & HOD Sri Ramakrishna Hospital, 395, Sarojini naidu Road, Sidhapudur, Coimbatore.	Yes
4.	Dr.M.Rangasamy	B.E., M.Sc., Ph.D.,	Lay Person	Former Professor Government College of Technology, Coimbatore.	No

Sri Ramakrishna Hospital

Medical Service : M/s. S.N.R. SONS CHARITABLE TRUST

SRI RAMAKRISHNA HOSPITAL ETHICAL COMMITTEE

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5.	Dr.S.Rajagopal	M.Ch.,	Clinician	Sr. Consultant Neuro Surgeon Sri Ramakrishna Hospital, 395, Sarojini naidu Road, Sidhapudur, Coimbatore.	Yes
6.	Dr.N.Paramasivan	MBBS.,MD	Basic Medical Scientist	Prof.of pharmacology and HOD Sri Ramakrishna Dental College and Hospital, Coimbatore.	Yes
7.	Mrs.Mythili Padmanabhan	M.Sc., (Physiology)	Social Scientist	Corresponded Vriksha 5/14, 2nd street, G.G.Avenue Coimbatore	No

This is to certify that the research work entitled **"Study On Drug Utilization Pattern Of Anti - Hypertensives In A Tertiary Care Teaching Hospital"**, placed before the Institutional Ethical Committee has been approved as there is no objection to do this research work.

This ethics committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information / informed consent and asks to be provided a copy of the final report.

The Ethics Committee wishes her well in her research.

Yours Truly,

Member Secretary,
Institutional Human Ethics Committee,

Dr. P. SUKUMARAN, M.S.,M.Ch.,FIACS.,
DIRECTOR / DEAN
SRI RAMAKRISHNA HOSPITAL,
395, Sarojini Naidu Road,
Siddhapudur, Coimbatore - 641 044.

COLLEGE OF PHARMACY

**Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore Ph.: 0422- 4500297, Email:
pharmacy_practice@rediffmail.com**

PATIENT INFORMATION FORM

Project Title: "STUDY ON DRUG UTILIZATION PATTERN OF ANTI - HYPERTENSIVES IN A TERTIARY CARE TEACHING HOSPITAL"

I am (Saranya V A), second year M Pharm student of College of Pharmacy, SRIPMS, Coimbatore which is attached to Sri Ramakrishna Hospital Coimbatore, pursuing a dissertation work, entitled **"Study on Drug Utilization Pattern of Anti-Hypertensives in a Tertiary Care Teaching Hospital"** which has to be submitted to the Tamil Nadu Dr. M.G.R. Medical University, Chennai for partial fulfilment for the award of degree of Master of Pharmacy. The details about the patient and the treatment are required by the investigator for carrying out the dissertation. It is here by assured that the details collected are only for the purpose of research and it will be helpful to the patient and care giver. It is also assured that the information obtained from the patient will be maintained confidentially. We hope you will provide us the necessary co-operation for the above mentioned work by providing a written consent.

Thanking you

Signature of the Supervisor

Mrs.B.Chitra, M. Pharm., (Ph.D).,

Assistant Professor, Pharmacy practice,

College of Pharmacy, SRIPMS,

Coimbatore-44

Signature of the Investigator

Saranya V A

M Pharm II year,

Pharmacy Practice,

College of Pharmacy, SRIPMS,

Coimbatore-44

COLLEGE OF PHARMACY

Sri Ramakrishna Institute of Paramedical Sciences,
Coimbatore Ph.: 0422- 4500297, Email:
pharmacy_practice@rediffmail.com

PATIENT CONSENT FORM

Project Title: "STUDY ON DRUG UTILIZATION PATTERN OF ANTI - HYPERTENSIVES IN A TERTIARY CARE TEACHING HOSPITAL"

I have been made understood the necessity of the work entitled **"Study on Drug Utilization Pattern of Anti - Hypertensives in a Tertiary Care Teaching Hospital"** that is being carried out by Saranya V A of II year M Pharm, College of Pharmacy, SRIPMS, Coimbatore. I voluntarily hereby agree by giving my consent to participate in this study and provide the necessary co-operation for the same.

Place: Coimbatore

Signature of the Patient/By-stander:

Date:

Name of the Patient:

Name of the By-stander:

Signature of the Supervisor:

Mrs.B.Chitra, M. Pharm.,(Ph.D).,

Assistant Professor, Pharmacy practice,

College of Pharmacy, SRIPMS,

Coimbatore-44

Signature of the Investigators:

Saranya V A

II year M Pharm,

Pharmacy Practice,

College of Pharmacy, SRIPMS,

Coimbatore-44

COLLEGE OF PHARMACY

DEPARTMENT OF PHARMACY PRACTICE
College of Pharmacy, SRIPMS, Coimbatore - 44.

Case No.

STUDY ON DRUG UTILIZATION PATTERN OF ANTI - HYPERTENSIVES IN A TERTIARY CARE TEACHING HOSPITAL

DATA ENTRY FORM

PATIENT DETAILS

Name	Age	Sex	Wt.	Ht.	BMI	IP No.	Dept.	DOA	DOD
Mr. Praveen	63	M	52	146	32	20184610	CIM	25/2/2018	29/2/2018

REASONS FOR ADMISSION c/o Shortness of breath, sleeplessness, decreased urine output, restlessness.

PAST MEDICAL HISTORY –

PAST MEDICATION HISTORY –

Vital Signs

Date	25	26	27	28	29					
Temp.	98.4	98.4	98.4	98.4	98.6					
BP	160/110	160/100	150/110	140/100	130/90					
Pulse	82	85	85	88	89					

Blood sugar (mg %)

Day	25									
F.B.S (70-100)	116									
P.P.S (<140)										
R.B.S (70-140)	155									

BLOOD COUNTS

Haemoglobin (g/dl) M:14-18 F:12-14	TLC (cells/cumm) (6000-10000)	ESR (mm/hr) (M<10; F<20)	Differential Leukocyte Count (%)			
16.5	7500	5	Polymorphs (40-75)	52		
			Lymphocytes(20-45)	33		
Platelets (1-4 lakhs)	Clotting Time(6-11min)	Bleeding Time(1-6min)	Basophils (0-1)	1		
2,000,00			Eosinophils (1-6)	3		
			Monocytes (2-10)	5		

LIVER FUNCTION TESTS

Total bilirubin (0.1-1.2 mg %)	1.1			Alk. Phosphatase (38-126 U/L)	101			RENAL FUNCTION TESTS: Urea (mg %) (12-35)	29		
								Uric acid (mg %) F-2.4-5.7, M-3.4-7	4		
P.T Time (12-15 sec)	15			SGPT (9-52U/L)	44			Sr.Creatinine (mg %) (0.4-1.4)	2.2		

ELECTROLYTES (mEq/l)

Sodium (130-150)	153			
Potassium (3.5 – 5.8)	6			
Chloride (95-105)	99			
Bicarbonate (22-39)	30			

URINE EXAMINATION

Colour	Pale yellow	Sugar	NIL
Bile salts	–	WBC	NIL
Bile pigment	–	RBC	numerous
Albumin	+	Casts	–

OTHER INVESTIGATIONS:

ECG, CT Scan

DIAGNOSIS:

Diabetes Mellitus, Systemic Hypertension, Chronic Renal Failure

DRUGS PRESCRIBED

S.No.	Drugs		Strength	Days of Treatment									
	T. Name	G. Name		25	26	27	28	29					
01	Inj pantocid	pantaprazole	40mg	✓	✓	✓	✓	✓					
02	T. Amlong A	Amlodipine	5mg	✓	✓	✓	✓	✓					
03	Inj. Lasix	Frusemide	20mg	✓	✓	–	–	–					
04	T. Atorvastatin	Atorvastatin	10mg	✓	✓	✓	–	–					
05	C. Aumitrol	Calcitriol	0.25mg	✓	–	–	–	–					
06	T. Clopilet	Clopidogrel	75mg	✓	✓	✓	✓	–					
07	T. Glycomet	Metformin	500mg	✓	✓	✓	✓	✓					
08	T. Restyl	Alprazolam	0.25mg	✓	✓	–	–	–					

RISK FACTORS

Smoker and Alcoholic

DRUG INTERACTIONS

DRUGS	EFFECT	SEVERITY	INFERENCE
Amlodipine + Clopidogrel	Decrease response to clopidogrel	Moderate	It may decrease the effect of clopidogrel on platelet inhibition.

NAME OF THE INVESTIGATOR: Soumya. V. A

SUBMISSION DATE: 29/2/18

Signature of the investigator

Signature of the staff